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金融工程學行為實證之研究-以艾略特波浪理論隱含波浪行為知識的發現為例
An Empirical Research of Financial Engineering Behavior:
Applied on the implicit knowledge discovery of the Elliott
Wave Theorist

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中華民國九十八年六月

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摘 要

台灣的股票市場是個淺碟型市場,股市的短期走勢易大幅波動,不容易掌握中長期趨勢。Fama 提出股市是沒有行為的效率市場假說;過去很多學者研究以歷史成交量、成交價為主的技術指標分析未來的走勢,證明股市是有行為的,但是卻沒有指出為何會有這些行為。

本研究嘗試以物理力量行為分析股市多空趨勢消長的情形,探討艾略特波浪圖形力量的存在。以艾略特波浪理論為基礎,提出一個N型波浪形狀的技術指標,利用N型波浪的斜率、位能、夾角、長度、時間的物理力量建構符合泰勒級數精神的倒傳遞類神經網路對台灣股票市場中期趨勢加以探討。

由實證結果得知,以本研究所提出的N型波浪的物理力量結合倒傳遞類神經網路來預測漲股市走勢,經過實驗與統計分析,顯著的大於隨機預測的準確度和投資績效。換句話說,驗證了股市物理力量的存在,而且和股市的走勢有相當程度的關聯,同時也驗證艾略特的波浪行為是有意義的。所提出的N型波浪指標也可以提供給投資人及專業人員一個中長期的參考技術指標。

關鍵字:金融工程學、艾略特波浪理論、Ⅰ型波浪指標、倒傳遞類神經網路

An Empirical Research of Financial Engineering Behavior: Applied on the implicit knowledge discovery of the Elliott Wave Theorist

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Abstract

Taiwan stock market is a shallow-plate market with high volatility, therefore it is difficult to forecast the market trend for a long period of time. While Fama believes behavioral finance is not to replace the efficient market theory, supporters of behavioral finance say that evidence of using technical analysis based on trade volume and price signals an inefficient market.

This study investigates whether there is a physical strength of the Elliott wave principle. Based on the Elliott wave principle, we propose an N-shaped wave technical index, and use the physical strength of slope, potential energy, angle, length, and time to construct back-propagation neural networks, and forecast Taiwan stock market trend.

The result shows that the proposed N-shaped wave technical index for back-propagation neural networks model is remarkable than random forecasting. Therefore reveal that the physical strength of stock market exists, and Elliott wave principle can be applied on market trend forecasting.

Keywords:

Financial Engineering, Elliott Wave Theory, N-type wave indicator, Back-Propagation Neural Network

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符號說明

P1: N型波浪的第1座標點

P2: N型波浪的第2座標點

P3: N型波浪的第3座標點

P4: N型波浪的第4座標點

L1:N型波浪線段,連接P1和P2

L2:N型波浪線段,連接P2和P3

L3:N型波浪線段,連接P3和P4

dL21: L2對L1的一階變量

dL32: L3對L2的一階變量

dL31: L3對L1的一階變量

d2L3221: dL32對dL21的二階變量

d2L3231: dL32對dL31的二階變量

d2L3121: dL31對dL21的二階變量

S1:N型波浪線段L1斜率

S2:N型波浪線段L2斜率

S3:N型波浪線段L3斜率

dS21: S2對S1的一階變量

dS32: S3對S2的一階變量

dS31: S3對S1的一階變量

d2S3221: dS32對dS21的二階變量

d2S3231: dS32對dS31的二階變量

d2S3121: dS31對dS21的二階變量

T1:N型波浪線段L1時間

T2:N型波浪線段L2時間

T3:N型波浪線段L3時間

dT21: T2對T1的一階變量

dT32: T3對T2的一階變量

dT31: T3對T1的一階變量

d2T3221: dT32對dT21的二階變量

d2T3231: dT32對dT31的二階變量

d2T3121: dT31對dT21的二階變量

1896

第一章 緒論

1.1 研究背景

財務金融領域在 20 世紀下半的進展超過了過往幾百年人類所有的經濟活動,不論是各種理論的建構、模型的建立或是實務上的發展;而在本領域的發展,都是建立在一個共同的理論假設上面: 效率市場假說。

長久以來基於效率市場假說,許多財務金融學者認為投資人的行為符合主觀 預期效用理論和理性,但是投資者具有不同的偏好、不同的風險承擔導致不理性 行為使市場價格偏離基本價值,這種非理性 参與者所制造的價格偏差,會很快被 套利所形成的市場力量所糾正,但實證上陸續發現市場價格行為並非如效率市場 假說所預期的理性,如股票市場一月效應、規模效應等等一些不理性的現象。

1979年諾貝爾獎得主 Kahneman & Tverskey 提出展望理論(Prospect Theory) 來描述人們在面臨不確定性問題時的決策模型,以解釋效率市場假說與現實環境間的差異,指出在實務上人類正常行為存在非理性因素。此理論也成為行為財務(Behavioral Finance)學派的立論基礎。2003年諾貝爾經濟學得主,Robert F.Engle提出的 Arch Model,說明股市的趨勢變動有其一定規則,更確立了行為財務學的立論。行為財務學派之學者對效率市場假說提出批評,並且證實金融市場具有非隨機行為現象的存在,也間接說明了效率市場的假說的不合理。

正因為效率市場假說的不合理,讓投資人了解到現實市場當中,必定存在著一些規則或是行為,如果能夠掌握這些行為規則,即掌握財富。這是所有投資人理財的夢想,也是一個不斷在追求的目標。因此如何預測金融市場的走勢,變成許多人研究分析的目標。技術分析即為股市趨勢變動分析中的一門方法,自從技術分析之父 Charles Dow 以「道式理論」開始了技術分析的大門以後,技術分析即廣為投資大眾所採用,此方法認為歷史會重演,利用歷史的價格與交易量等資料,透過統計歸納方法,將歷史資料轉換成為圖形或指標數值,根據循環擺盪的軌跡來預測未來股價方向走勢之變化,以期能夠獲得超額報酬。

艾略特波浪理論是相當有名的技術指標分析方法,不管是運用在股票價格趨勢分析、或期貨的進出場點、支撐壓力的轉折點判斷,甚至是選擇權交易策略的多空大略擬定,都扮演非常重要的角色。然而艾略特波浪理論為技術指標當中相當具有爭議性的一門方法,波浪理論通常是在行情發生後再反觀過去發生的波浪的型狀,才能看清所經歷的究竟是何種類型的行情,但是在推估未來判斷的方面略顯不足。研究艾略特波浪理論的投資人對艾略特波浪理論的評價十分的兩極,

推崇者,將之奉為圭臬;而反對者,則棄如敝屣。會產生如此大之差異,根本的 原因在於技術分析的本質。

技術分析是一門經驗之學,使用技術分析之學者相信股票市場歷史會重演以過去之經驗必定可推估未來,對於技術分析的批評往往是由於技術分析所依靠的經驗法則沒有一定的準則,不同的投資人對同樣的技術分析指標也會因此產生不同的解讀,許多投資人因為不了解技術分析的精神,以過於主觀的角度來分析判斷技術指標數值,導致技術分析的效果不彰。而人工智慧的規則學習可以彌補這樣的缺陷,它可以在不確定的環境下有效的學習其中的知識與規則,而不需藉助主觀的判定,正好可以改善技術指標過於主觀的缺點。

人工智慧的技術眾多,舉凡模糊邏輯、基因演算法、專家系統、類神經網路等等,每種技術都有其適用的領域以及狀況,當中,最常被用來作模型預測的是類神經網路,因為類神經網路有不斷學習並改善推論結果的優點,同時在單純且穩定的環境下,可對環境作出良好的預測。然而它也有許多為人所詬病的缺點,如:過度訓練導致預測結果失準,學習速率設定值、沒辦法收斂等等。在以往的研究當中,已經證實這樣的缺點可以藉由資料的前置處理達到良好的改善,而在前置處理的部分,大都數是採用一些統計上的方法,或是將物理學上所觀察到的現象導入,讓資料在輸入類神經網路訓練之前,已經有某種相當程度的純化以及關聯性,避免產生"Garbage in, Garbage out"的結果。

股市價格的波動,通常被視為是一個隨機過程,因此當市場具有效率性時,股市價格的行為會呈現出馬可夫過程(Markov process)。自 1900 年開始,法國數學家 Louis Bachelier 在其博士論文中,就已經開始以物理學中粒子的布朗運動(Brownian motion)作模型,去估計認股權的價格。一些物理學家以熱力學與統計力學描述大量粒子的行為的理論,也逐漸地被財務與經濟學家引入於描述眾多市場參與者的行為。自從 Black-Scholes 的選擇權評價模型提出後,物理學相關理論更被大量運用到財務領域中,發展出金融物理學(Econophysicals) [Stanley, Physica A, 1995]。

近年來,在股價模型的發展上,開始有學者將股價技術分析的資料,以金融物理學、行為財務學等觀念進行資料的前處理,發展出出各種人工智慧模型的股價預測模型,然而對於艾略特波浪理論的應用上,相關研究較為缺乏,因此本研究將以艾略特波浪理論為基礎,提出 N 型波浪的物理力量作為人工智慧股價預測模型,來驗證股票市場漲跌力量的消長,確實可以用這些物理行為來解釋。

1.2 研究動機

台灣的金融市場在衍生性商品的推出以後,投資人得以從以往單純的股票投資到各式符合投資人需求的商品,像是期貨、選擇權、基金等等,投資人希望藉

由這些金融商品能夠達到投資理財的目的。雖然眾多衍生性金融商品的推出,但 一般投資大眾依然青睞股票的投資,因為投資人有機會在股票市場中獲得較定存 更高的報酬,然而其風險較其他衍生性金融商品低了許多,因此股票市場仍然吸 引了許多保守投資人的參與。

然而台灣的股票市場是個極易受消息面影響而走勢大幅起伏的市場,個股股價受到太多不公開的資訊影響而受到少數人的操控,如內線交易、五鬼搬運等等,2007年1月,王又曾於力霸集團爆發財務危機,導致台灣股市重挫,股災不斷,且投資人損失慘重。由此可見投資單一公司的風險很高,實非一般投資人有能力承受之重。相對之下,大盤指數卻沒有這樣的問題,因為大盤指數的走勢是受到整體環境影響,不論是在政治面、社會面、經濟面,都是全體投資者操作下的結果,研究大盤指數的走勢相對於個股研究來得合理公正,投資人亦可以藉由指數,操作期貨。

投資人所追求的,往往是一年內的投資報酬高過銀行利息,如8%、10%,然而利用大盤指數所產生的衍生性商品,如期貨、選擇權,在槓桿的操作之下,往往掌握一個波段,就能夠超過投資人一整年所期望的報酬與漲跌幅,如果能夠在一年之內掌握到一個波段,則整年的投資報酬目標即可達成,滿足投資人投資的目標。

因此,如何有效的預測股市走勢的波動,正確的掌握波段,滿足投資的需求,變成了本研究最主要的動機;由於[1.1 研究背景]當中的背景闡述,可以了解到由於效率市場假說的不完整,導致許多投資人紛紛研究起技術指標,期望能夠以過往的歷史資料分析來預測未來的走勢。而技術指標當中,艾略特波浪理論為相當具有爭議性的一門方法,正反的評價差距極大,也興起了作者對艾略特波浪理論的研究興趣。順應近年來人工智慧在金融預測方面的研究盛行,利用人工智慧的方法似乎能改善以往技術分析過於主觀的缺點,因此產生了希望能夠利用人工智慧的方法,以艾略特波浪理論為基礎,研究發掘當中的經驗與知識,結合金融物理學的觀念,來預測股票市場的趨勢,協助投資人掌握未來股票市場趨勢方向,在茫茫股海中投資的方向。

1.3 研究目的

本研究以技術指標中的艾略特波浪理論為基礎,提出一個 N 型波浪形狀的技術指標,利用類神經網路不斷學習並改善推論結果的優點,對台灣加權指數做分析,期望找出當中的行為規則,以輔助投資人作決策。以下是整個研究所希望達到的目的:

(一). 以艾略特波浪理論為基礎,設計出新的技術指標,驗證波浪理論的物理意義的存在。

- (二). 驗證金融市場中物理行為是影響股價趨勢的重要因素之一。
- (三). 驗證金融市場的趨勢具有行為模式,而非效率市場假說的隨機漫步。
- (四). 利用類神經網路,預測台灣加權指數的趨勢。

1.4 研究範圍與限制

本研究以艾略特波浪理論為基礎,提出一個N型波浪形狀的技術指標,探討物理力量運動來預測台灣股市的趨勢行為。資料主要範圍如下:

研究日期範圍:日期1987/02/07~2009/02/06,共22年資料。

1.4.1 研究資料來源

台灣證券交易所 - 加權股價指數

1.4.2 研究限制

- 1. 本研究不考慮利率、物價變動、期貨保證金變動的影響。
- 2. 每口交易成本僅考慮買進、賣出來回之手續費及交易稅。
- 本研究假設台灣大盤加權指數與台指期貨的點數在任何時刻皆相同且等 於大盤加權指數,以方便計算獲利。
- 4. 對於交易模擬,進場訊號出現後次日開盤價價進場交易,停損、停利訊號 出現後立即交易出場。
- 由於交易時會有掛單價格與成交價格不一樣的狀況,本研究假設掛單價格 皆能觸價成交且立即成交。

1.5 研究流程

研究流程如下圖所示,因實際股市行為模式與傳統財金理論背離,因而引發研究動機與設立研究目的。由文獻探討回顧各界學者在行為財務學、倒傳遞類神經網路、技術指標應用等不同構面的研究,描繪本研究之藍圖架構。且依據所設定的研究模型蒐集台灣加權指數日 K 線資料進行資料前處理的工作,並設計實

驗離型與交易機制,期間並根據實驗結果進行模型架構之修正。最後以完整的模型進行模擬交易驗證,分析其結果,建立本研究之結論,並提供後續研究之建議方向。

本研究流程如下圖所示:

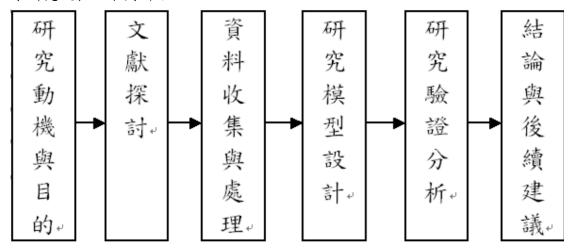


圖 1 研究流程

1.6 論文架構

本論文之架構分為五個章節, 說明如下

第一章 緒論

說明研究背景、研究動機與目的、研究對象、研究流程等小節。

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第二章 文獻回顧

針對本論文研究的題目進行文獻的探討與回顧,包含效率市場假說、行為 財務學、金融工程學、艾略特波浪理論、倒傳遞類神經網路等應用於金融市場實 證之文獻。

第三章 研究方法

描述本論文的研究方法、資料蒐集與資料前處理流程,並說明本研究之系統架構,並訂定投資策略,使實證模擬結果能得以具體呈現。

第四章 實驗結果與分析

說明實驗設計並依據實驗組與對照組之實驗結果進行分析比較。

第五章 結論與建議

總結研究結論並提出未來之改進方向

參考文獻 參考文獻列表

附錄

本研究相關參考資料



第二章 文獻探討

2.1 效率市場假說

Fama(1970)提出效率市場假說(Efficient Market Hypothesis, EMH),此假說假設投資人因受到自我利益驅策,因此可以做出理性的決策,且認為在市場資訊公開與即時的假設下,股價變動是呈現隨機漫步(random walk)模式,市場能夠立刻反應資訊並調整價格,投資人無法以技術指標或是基本分析來獲得超額報酬。效率市場假說認為人是理性的,所以股價將反應所有的相關資訊,即使股價偏離基本價值,隨著時間的經過,資訊的取得越來越公開訊息,投資人將藉由學習而正確解讀訊息,因此股價必定會回歸基本價值,所以價格的偏離是短期的現象。

效率市場假說主要建立在三個假設:

- 1. 投資者是理性的,因此能理性的評價證券價格。
- 2. 即使有些投資者是不理性的,但由於他們的交易是隨機的,所以能消除 彼此對價格的影響。
- 3. 若部分投資者有相同的不理性行為,市場仍可利用『套利』機制使價格 回復理性價格。

而由效率市場理論延伸發展,Fama 依市場效率性質提出弱式效率市場假 說、半強式效率市場假說及強式效率市場假說,其分述如下:

- 1. 弱式效率市場假說(Weak Form Efficiency) 股票價格已充分反應過去股票價格所提供的各項情報。所以,投資人無 法在運用各種方法對過去股票價格進行分析,在利用分析結果來預測未 來股票價格,意即投資者無法再利用過去資訊來獲得高額報酬。所以, 弱式效率之趨向越高,越無法以過去價量為基礎的技術分析,來進行預 測效果,因其效果會十分不準確。
- 2. 半強式效率市場假說(Semi-Strong Form Efficiency) 股票價格已充分反應於所有公開資訊上,所以,投資者無法利用情報分析結果來進行股票價格預測而獲取高額報酬。因此,半強式效率之趨向越高,依賴公開的財務報表、經濟情況及政治情勢來進行基本面分析,然後再預測股票價格是徒勞無功。
- 3. 強式效率市場假說 (Strong Form Efficiency) 股票價格充分反應了所有已公開和未公開之所有情報。雖然情報未公開,但投資者能利用各種管道來獲得資訊,而所謂未公開的消息,實際上卻是已公開的資訊且早已反應於股票價格上。此種情形下,投資者也無法因擁有某些股票內幕消息而獲取超額報酬。

Fama(1970) 認為即使有非理性投資人,由於這些非理性的交易都是隨機產生,因此自然而然的彼此抵消掉。但非理性投資者的決策並不完全是隨機的,常常會朝著同一個方向,所以不見得會彼此抵銷。Shiller(1984)確認了上述的行為,當這些非理性的投資者的行為社會化,這種現象會更明顯。Shiller(1984)指出:非理性的投資者的行為會社會化,影響投資人情緒的因素並非隨機產生的錯誤。

Black(1986)指出投資人做交易時的依據是雜訊而不是資訊。

Kahneman & Riepe(1998)歸納出三點將導致人們無法做出符合傳統理性決策模型的因素:

- 1. 投資人對風險的態度不為定值。
- 2. 投資人的預期往往會違反貝式機率法則。
- 3. 問題的框架(frame)會影響投資人的決策。

Shleifer & Vishny(1997)和 Thaler(1999)指出:市場上有假性理性投資人之存在,其投資決策會影響到理性投資人,使其之套利行為受到限制,而無法使資產回到理性價格。

2002 年的諾貝爾經濟學獎得獎主為心理學家卡尼曼(D. Kahneman 1998) Kahneman & Tversky(1979)在展望理論中指出:非理性投資人的決策並不完全是 隨機的,常常會朝著同一個方向。

而 2003 年諾貝爾經濟學獎得獎主則是計量經濟學家恩格(R. Engle),其發明了 ARCH 模型(Engle 1982),能夠預測並分析會隨著時間變化的股票價格、外匯匯率以及利率的變動。此兩位諾貝爾獎的得主推翻了以往傳統財務金融領域所認定的假設,行為財務學因此而誕生;而近年來,越來越多的研究利用各種人工智慧的方法對於金融市場的各種狀況做分析與預測,其研究結果也優於傳統的策略,顯示出行為財務學正逐漸被接受,並漸漸打破「股市的未來趨勢是不可預測」之說法。

陳正榮(2000)以檢驗弱式效率市場常用之個股股價濾嘴法則 (Own-stock filter rules) 外,並加入多種交易法則,完整地驗證台灣股票市場之弱式效率性,檢驗台灣股票市場在某些交易法則下,投資人是否可以打敗市場,得到超額報酬。其結果顯示台灣股票市場於 1991 年 1 月至 2000 年 12 月期間並不具備弱式效率性,因為無論就各種濾嘴組合或移動平均模型來看,平均而言,此二個交易法則之操作績效皆優於買入持有策略。

李良俊(2002)利用技術分析分析台灣股票市場是否具有弱式效率市場之特質,以技術指標找出交易的買賣時點,並觀察是否能獲得超額報酬,及瞭解是否與基本因子有關,進而掌握市場股價的波動,提高交易的決策能力。並驗證投資人是否可以擊敗市場,持續獲得超額報酬。其結果顯示在良好的分析下,在不同的環境採用適當的技術指標皆能打敗以效率市場假說為基礎的買入持有策略。推

翻台灣為弱式效率市場之假說。

由以上文獻可以得知,效率市場假說當中存在著某種程度的謬誤,其對於實際金融市場上的諸多現象沒辦法有完善的解釋,而在台灣股票市場上,也存在這樣的現象,以往常假設台灣符合弱式效率市場假說,然而透過多位學者的研究實証也得知這樣的假說在某些情況下是沒辦法解釋的。

2.2 行為財務學

效率市場假說假設人們的行為符合主觀預期效用理論和理性,即使有不理性 行為驅使市場價格偏離基本價值,也會很快被套利所形成的市場力量所導正,但 實證上陸續發現市場價格行為並非如效率市場假說所預期,主要原因在於人們面 臨決策時,常會受限於人性的複雜而產生非理性行為,且套利力量在實務上有其 極限,使得這些非理性行為將會持續的影響金融市場的效率性。行為財務學從展 望理論出發,藉由一些觀察、實驗所發現的人類決策時常見的心理偏誤來取代現 代財務模型中的理性行為假設,進一步解釋一些傳統財務理論所無法解釋的實證 發現。

財務學蓬勃發展的原因之一是在 Kahneman and Tverskey (1979)提出的展望理論(prospect theory) 說明人們在面對不確定性下從事決策的模型,以解釋傳統預期效用理論與實證結果的分歧,傳統預期效用理論並無法解釋某些情況是風險愛好者及那些情況是風險趨避者。另外個人在做決策時,並非理性的會對所有的可能情境做詳盡的分析,而是常常有認知的偏誤(cognitive bias),常以經驗法則或直覺作依據,反應在投資行為上,則出現了過度反應或反應不足。這些與過去效率學派所假設理性行為相抵觸,都慢慢在行為財務學派獲得一些解答。

Richard Thaler(2003)提出行為財務學對於傳統效率市場假說的兩個盲點:套利極限以及投資者心理學的角度,他認為套利機制在實際金融市場上並非完全無風險。套利的產生最重要的是要有完美的替代品。某些金融商品如期貨或選擇權比較容易套利,因為完美的替代品較好取得。而股票則常常只能選擇近似的替代品。如此套利自然就存在著風險。而在投資者心理學方面,理性的投資者會按照貝氏法則(Bayes' law)來做預測,也就是會根據所獲得資訊適當的調整各種可能發生狀況的機率而做出新的預測。但是心理學家 Kahneman 和 Tversky 指出人們對不確定的結果時,常會做出違反貝氏法則或其他關於機率的理論之預期。

根據 Haugen (1999) 的文獻,其將財務理論發展區分為三個階段,包括了舊時代財務 (oldfinance)、現代財務 (modern finance) 以及新時代財務 (new finance)。

- 1. 第一個階段主要是以會計與報表分析為研究
- 2. 第二個階段則以理性學派為前提的財務發展

3. 第三階段發展則是以行為學派為首的財務異象研究

這時以心理學對投資人決策過程的研究成果為基礎,重新檢視整體市場價格 行為的行為財務學便獲得重視。Statman 這樣描述行為財務學:『不是傳統財務學 的分支;而是以較佳的人性模型取代傳統財務學』。

從以上文獻可以得知,許多學者在行為財務學上面的研究,使的傳統效率市場假說的理性投資人的假設漸漸的被假性理性(quasi-rational)投資人或更靠近真實市場行為的假設所取代。所有這些行為財務學的理論與實證發現似乎都在論述著同樣一件事情:金融市場是沒有效率的-至少不像效率市場假說所預期的那麼有效率。

2.3 技術分析

技術分析是以19 世紀末 Charles Dow 所提出的道氏理論做為基礎,其後由 William Peter Hamilton 與 Robert Rhea 總結歸納而成,才使道氏理論有了完整的理論結構。謝劍平(2009 投資學)提出道氏理論認為股票市場有三種不同層次的波動存在,分別如下:

- 1. 基本波動:指股價長期的變動趨勢,此趨勢可能持續數年才會有所改變。
- 2. 次級波動:在基本波動下存在數個次級波動,而這些波動常稱為「技術修正」或是「盤整」。次級波動的產生主因在於投資者有時對股市過於樂觀或悲觀,摻雜理性與非理性因素,致使股市產生超漲、超跌而有技術性的回跌或反彈。
- 3. 日常波動:隨機出現上述波動中,常因為短期的利空或利多消息造成, 在消息經過一段時間後,對股價的影響力就會消失。屬於極短期的價格 波動,易受人為操控。

因為道氏理論的開創,其後的研究便開始往波動率的發現與價格走勢的預測 進行探討。經過多年研究,技術分析的相關指標與方法多至不可計數,協助投資 人針對所需選定多種技術指標搭配使用,以提高交易獲利的可能性。

股票市場和一般商品的定價模式的本質是相似的,這是技術分析的理論基礎論述,其買賣成交價格和成交數量的增減,決定於買賣雙方供需力量的均衡。只要市場一有供需力量失衡狀況出現即可能發生長期或短期的大量買入或賣出之異象發生,股價因而會發生波動。而對此買賣力量模式的研究,最直接的就是認為股市的買賣力量之走勢行為具有慣性,而供需力量是驅使這個慣性的動能。分析過去的供需力量,如:交易紀錄的價格和成交量,可以提供對未來股票價格走勢慣性的預測。

Levv(1966) 將技術分析理論歸納如下:

- 1. 股票價格與趨勢的變化是由供需雙方互相作用決定。
- 2. 供需情形受到理性與非理性因素影響,價格會先行反應各項不對稱之資 訊優勢。
- 3. 長期而言,價格發展呈現某種特定趨勢,股價會依循此趨勢移動,因此順應趨勢是技術分析的基本精神。

Reilly(1985)指出技術分析需符合下述條件:

- 1. 資訊的取得來源限定已公開的資訊,如歷史價量資訊等,不能使用未公開之訊息。
- 2. 在衡量報酬率時,應考量交易成本與稅賦。
- 3. 投資報酬率必須和在相同風險程度下的個股投資報酬率進行比較。
- 4. 超額報酬必須存在於一段長期時間內。

技術分析主要有三大類別:

- 1. 判斷股價趨勢為主:趨勢分析、道氏理論、趨勢線及移動平均線等。
- 2. 樣式比對為主: K 線系統、整理與反轉型態、支撐、阻力、突破以及 箱形理論等。
- 3. 分析投資人預期行為的人性心理指標:成交量圖、OBV線、融資融券等。

技術分析之資料來源主要是過去成交紀錄的價與量。因此技術指標的研究發展最初即是針對價與量之數值,依合理的方式,進行數學處理而產生。技術分析以價量為基礎衍生出多項數值指標,因此根據所採用的分析資料來源可以區分為針對價貨量之趨勢以判定其波段方向的趨勢指標;純粹就成交價的開高收低價來處理的指標,稱之為價指標;若純粹就成交量、值或筆數處理的指標,稱之為量指標;若需綜合不同觀念,以致需透過為此發展的數學演算法計算之指標,稱之為綜合指標。

Robert(1971)指出,技術分析是以預測股價的變動方向為主,而非預測股票的價格。將歷史的價量資訊轉化成為各項指標後,可以運用短期的波動情形來探討長期的走勢,預測股價波動方向與買賣時點。雖然市場上有眾多因素會干擾價格走勢,導致技術分析會有錯誤發生,但是投資人仍然可以同時參考多個技術指標,如此決策品質將更提升。

2.4 艾略特波浪理論

波浪理論是由 Nalph Nelson Elliott 在 1938 年所發表的價格趨勢分析工具,它也是近年來技術分析界運用相當廣泛的一種工具。艾略特認為:「不管是

股票或是任何商品價格的波動,都與大自然潮汐一樣,具有一種相當程度的規律性。」。中國古云:[水無定勢,法無定法]。波浪是自然現象,波浪的運動,在於內在動能的驅動或外在力量的攪動,如潮汐、地震、山崩、火山爆發、爆炸,隕石,颱風都會引起內外力的交互作用,而有波浪由靜止、發展、完全發展的現象。所以,波浪現象的循環,可以從能量來源的角度解析。其實這個原理和產業周期循環也很接近,運用於越多人參與的市場會越準確,因為人性也是一種大自然的現象。事實上,它是由艾略特針對美國股市近七、八十年的走勢,研究所得之結論。他將股市的運動以簡御繁來歸納股價波動,其內部隱含著混沌理論當中的碎形及自我相似的概念,以上漲五波,下跌三波,來規範整個股市運動的基本型態。

「波中有波浪中有浪」則是波浪理論之基本構想,它包含了兩種概念:其一,波浪理論可以往內無窮分解,大浪可拆成中浪,中浪再分解成小波,小波之下仍有微波[33]。換言之,波浪理論認為不論是長天期的大走勢,或是短天期的小走勢,皆呈現波浪一般的形態。其二,任何一個波浪只是它上一級走勢中的一小部份,它必須往外無窮延伸。這一概念告訴我們,處身某一波浪時,必須先設身處地瞭解目前所處的地位,才能預測未來的走勢。

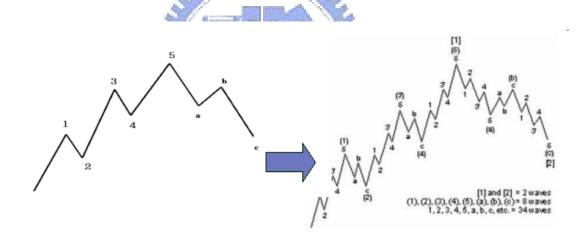


圖 2 波浪理論之基本構想「波中有波,浪中有浪」

艾略特波浪理論提供了兩個重要的觀點,首先是股市中的走勢,具有相當程度的規律性,如果能夠發現這種規律性,對於掌握股市未來走勢會有相當大的幫助,其二是股市當中的走勢,會受到前一波的影響,也映證了 Garch Model 所提出的概念,波動會受到歷史波動所影響。

2.5 類神經網路

類神經網路是一種能適應新環境的系統,乃是透過自我的學習來建立其對欲

處理問題之知識,它具有分析、預測、分類等能力,能針對過去的經驗或資料重 覆學習,模擬人類大腦學習複雜事務及現象的系統(Resta, 1998)。也就是說, 類神經網路能夠表達及建立適當的模型,或是預測一已知系統之行為,而不用事 先給予已經系統之行為規則或系統模型。與傳統數值方法相較起來,神經網路方 法是一種不需估計參數的技術。一個類神經元構成之要素如下分別所示:

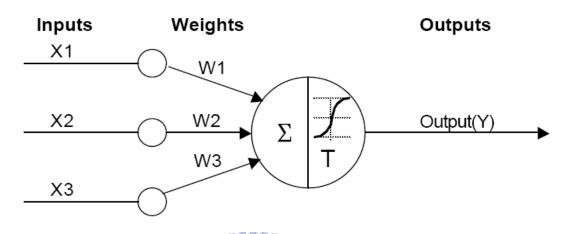


圖 3 類神經網路的基本結構

- 1. 輸入與輸出(Input Unit and Output Unit, X and Y): 功能類似生物神經細胞之樹突,負責傳遞與接收神經訊號,以數學方式表達則是輸入輸出之變數。
- 權重(Weight, W):類似生物神經細胞之突觸。輸入之訊號經過加權處理 後會得到增強或是抑制,類神經網路即是透過不斷調整權重來達到學習 之效果。
- 3. 結合函數(Combination Function, Σ): 此函數將所有加權過後之輸入變數加總,以得到單一之輸出值。
- 4. 轉換函數(Transfer Function, T):結合函數和轉換函數可視為生物神經細胞之神經核。轉換函數將加總過之值經過線性或非線性函數之變調處理,以得到神經元之輸出值,常用的轉換函數有 Bipolar function、Saturation function、Ramp function、Sigmoid function和 Gauss function等。(溫福助,2000)

由於類神經網路具有學習、容錯、分群能力、以及可處理非結構問題之能力 的特色,能夠經由分析過往行為而掌握對未來狀況的處理,因而在金融投資決策 領域上廣泛地應用,以下是類神經網路在財務預測方面的文獻整理:

Lapends and Farber(Lapends 1987)以倒傳遞類神經網路演算法為模型工具,針對美國 S&P500 股價指數進行預測工作,實證研究結果發現利用類神經網路所建構的模型,其預測能力相較於傳統統計方法的移動平均法來得好。

Glaria et al.(Bengoechea 1996)使用前十日的指數與成交量當作輸入變數,建

構類神經網路模型來預測聖地牙哥股市的隔天指數,研究中選擇的資料樣本為聖地牙哥股市的240日交易資料,實證研究結果發現此模型在上漲區間的準確率為63.3%,在下跌區間的準確率為74.7%。

除了單純將類神經網路工具以外,有些學者亦加入其他人工智慧方法,結合 類神經網路模型進行預測。

阮瑜芳[16]整合分類元系統與倒傳遞類神經網路,構成:分類元-類神經網路股票交易系統(CNTS)。研究總取樣資料為2002年3月1日至2007年3月14日台灣加權指數。CNTS實證之第一部份是將訓練資料及測試資料劃分為加權指數上漲時機的訓練資料集、加權指數上漲時機的訓練資料集、加權指數上漲時機的測試資料集、加權指數上漲時機的測試資料集。隨後CNTS實證之第二部份以知識純化模組分別對各資料集進行訓練及測試。實驗結果顯示,CNTS在二份測試資料上的測試準確率超過50%,足以顯示市場趨勢並非隨機漫步,且人工智慧技術可幫助投資人對股市進行更準確的預測。

林秀怡[29]結合模糊邏輯與倒傳遞類神經網路,建構一個 Fuzzy-BPN 的模型,採用台灣 ETF50 的資料,對於 Garch Model 做改善,實証結果顯示,在衡量預測結果的績效上面,準確性優於傳統 Garch Model,雖然在保守性以及效率性上面傳統 Garch Model 表現較佳,然而在沒有兼具準確性的前提下,保守性跟效率性是沒有意義的。

由以上文獻探討可以得知,類神經網路在股票市場預測上面確有其卓越之處,而當中倒傳遞類神經網路尤佳。因為這些財務金融的波動指數或技術指標變數並不具有可加性,而倒傳遞類神網路卻可以對這些變數進行整合。如果能夠配合其他方法,將資料再輸入類神經網路前先行處理並純化,對於提升神經網路的準確性有明顯的效果。

2.6 泰勒級數

泰勒展開式,是將一個函數以多項式來表示的一種方式。可推導出 Taylor 級數定理如下

假設 $f^{(n+1)}$ 存在於(a,b)之內且x為(a,b)任一點。則

$$f(x) = f(a) + \frac{f'(a)}{1!}(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \dots + \frac{f^{(n)}(a)}{n!}(x-a)^n + \frac{f^{(n+1)}(\xi)}{(n+1)!}(x-a)^{n+1}$$
(1)

其中 a<ξ<x

邱泉和[39]提出提出符合泰勒級數精神的類神經網路模型,採用個股每股盈

餘及技術指標 MACD 的一階、二階變量藉由類神經網路學習,對進行個股股價做預測;實驗結果得知,本模型以讓投資的準確率提高。

假設 股價=f(x)

股價 ≒ 原始量 + 變動量 +變動量的變動量

股價的趨勢 ≒ f(EPS原始量 + EPS變動量+ EPS變動量的變動量)

+g(MACD原始量 + MACD變動量+ MACD變動量的變動量)

+...

由以上文獻探討可以得知,泰勒級數能用多項式逼近任意函數,使用一階、二階... 導函數解析出函數結果;但由於金融投資決策中很多自變數是不具可加性的;是一個無法用數學公式模型化的非線性問題,很難使用泰勒展開式直接推導,然而類神經網路具有學習、容錯、分群能力、以及可處理非線性結構問題之能力的特色,能夠經由分析過往行為而掌握對未來狀況的處理,因而在金融投資決策領域上廣泛地應用,而當中以倒傳遞類神經網路在金融市場預測的領域表現尤佳,如果能夠配合泰勒級數一階二階導函數方法,將資料在輸入類神經網路前先行處理並將外在環境因素單純化,對於提升神經網路的準確性有明顯的效果。

第三章 研究方法

綜合第一章及第二章內容,本研究提出一個倒傳遞類神經網路模型。本章將 詳細描述本實驗架構資料的收集與處理、所採用的方法學、輸入輸出變數、以及 整個模型的評估方式。

3.1 研究模型架構

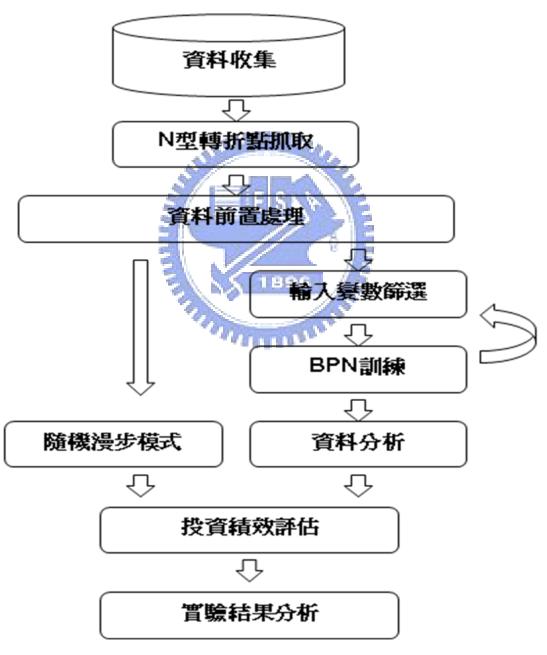


圖 4研究架構流程圖

3.2 實驗流程

本研究利用倒傳遞類神經網路不需事先給予系統化之行為或系統模型,而 能夠透過自我學習而具有分析、預測、分類等能力的優點;透過物理力量的學習, 期望能夠合理的解釋股市並非絕對效率市場的現象,以及股市當中具有其相當的 行為模式,以股市的物理力量預測未來的走勢。本實驗之流程設計與步驟如下:

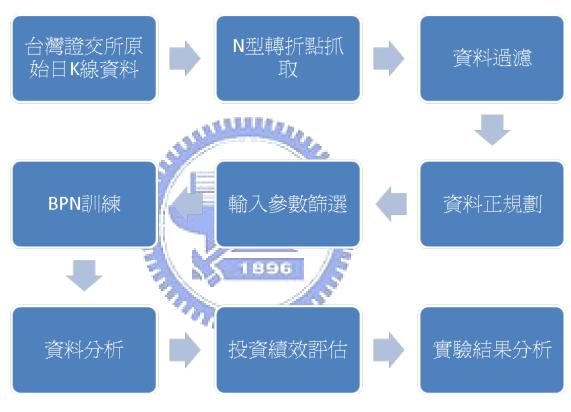


圖 5實驗流程

3.2.1 資料收集

本研究所使用資料採用台灣證券交易所公布的台灣加權指數歷史日K線資料,從1987年2月7號至2009年2月6號的日K線資料,總共22年的資料,根據 Kerns[10]在研究中提到,將輸入資料作分割,因此以前16年的資料當作訓練資料,後六年的資料為測試資料。

訓練期間:1987/02/07~2002/12/31

測期資間: 2003/01/01~2009/02/06

3.2.2 N 型波浪型態定義

艾略特波浪理論認為股票市場的發展遵循五浪上升、三浪下跌的型態 [32][33]。本研究以艾略特波浪理論為基礎,分解波浪的組成;三條連續的線段組成一個基礎波浪;又可分為正N型波和倒N型波,在本研究中將這二種波統一稱呼為N型波。觀察艾略特波浪,不論是上漲波或是下跌波其波峰或波谷必定是區域的最高點或最低點,當經過波峰或波谷後波浪的走勢方向將會反轉,我們定義這些波峰和波谷為轉折點。試圖以其中的N型波浪來預測未來一個轉折點的走勢,圖3.1為一個基本N型的屬性定義:

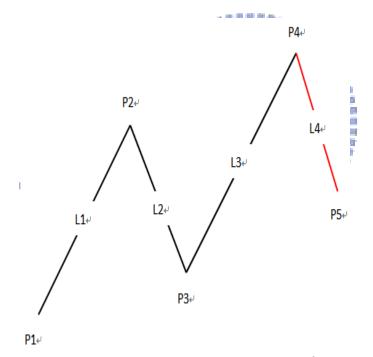


圖 6 N型波浪基本屬性

- 1. 座標點(P1,P2,P3,P4):坐標軸橫軸為時間,以日為1單位;縱軸則為加權指數,以指數1點為單位,此座標點即為加權指數的轉折點。座標點P5即是本研究欲預測的目標。
- 2. 線段長度(L1,L2,L3)

連續二個轉折點相連接成為一個線段,即L1是由座標點P1和座標點P2相連;L2是由座標點P2和座標點P3相連;L3是由座標點P3和座標點P4相連; L4是由座標點P4和座標點P5相連的第四條線其中座標點P5為本研究所欲預測 之目標,預測值將會透過正規化的轉換來產生,最後將預測結果去正規化以及區間化來達到輔助投資決策的目的。

3.2.3 N 型抓取

艾略特描述的波浪可以分為不同的級次,包括超大循環波、超循環波、循環波、主波、中型波、小型波、短波、微波和超微波;波中有波是這些不同級次波的特徵[33]。大級次的波浪它的前後轉折點相距較遠;也就表示它具較大區域的最高點或最低點。而一個大級次的波浪是由很多小級次的波浪所組成,就是所謂的波中有波的概念。本研究中N型波浪當中的座標點即為股市中的轉折點,採用以不同的時間長度代表不同區域大小,抓取各種不同級次的轉折點,抓取的方式如下說明:

- 1. 建立連續最高點或連續最低點的天數
 - (1) 設定搜尋區間範圍 d,-100<= d<=100,往前往後 100 日
 - (2) 以日為基準點,在搜尋區間範圍內搜尋並記錄最高以及最低點
 - (3) 往後推一日,繼續乙的動作,直到完成全部資料
- 2. 計算不同級次的波浪轉折點
 - (1) 設定波浪級次從 3 日到 100 日, 3<x<=100
 - (2) 比較最高以及最低點的連續日數,如果超過甲的波浪級數值,則暫時設定為轉折點
 - (3) 往後推一日,繼續 2.(2)的動作,直到完成全部資料
 - (4) 往後推一個波浪級次,繼續甲的動作,直到完成全部資料
- 3. 去除重複的 N 型轉折點資料 由於近似的區間所抓取的 N 型轉折點會有重複之情況,因此會先將重 複的 N 型轉折點資料去除以後,再繼續做資料的處理。

下圖為執行抓取 N 型轉折點程式後的截圖:



圖 7 N 型抓取程式之截圖

3.2.4 輸入變數

湯麟武[40]使用波浪的力學性質:波浪高度(wave heigh)、波浪長度(wave Llength)、波浪週期(wave period)、波向線(wave ray)、波位相角(phase angle)、波譜密度(wave spectrum desity)...來做港灣波浪水位的推算。雖然股市波浪的力學性質和物理概念並不全然相同,但性質相似,而且股市波浪的物理力學性質在金融領域的參考文獻並不多見。艾略特卻認為:「不管是股票或是任何商品價格的波動,都與大自然潮汐一樣,具有一種相當程度的規律性。」。本研嘗試以波浪的力學性質為參考,計算股市 N 型波浪的各種物理力量,總共有六大構面,分別是位能(E) 、長度(L)、斜率(S)、夾角(An)、時間(T) 與面積(A)。每個構面皆有其不同的組合,分述如下:

- 長度(L) 如圖 3 N 型波浪基本屬性中,連接相鄰二個轉折點形成長度, 如連接點 P1 和點 P2 形 L1 線段;代表波長大小。
- 2. 時間(T) 如圖 3 N 型波浪基本屬性中,波浪從 P1 走到 P4 為一完整 N 型波浪時間週期,計算各線段長度所佔時間在波浪週期的比例。
- 3. 位能(E) 如圖 3 N 型波浪基本屬性中, 座標點 P1,P2,P3,P4,P5 的 Y 軸的

高低,也就是大盤的指數;代表波浪的深度大小。

- 4. 斜率(S) 如圖 3 N 型波浪基本屬性中, 計算各線段在二維座標中的斜率 大小。
- 5. 夾角(An) 如圖 3N 型波浪基本屬性中,計算各線段和 X 軸所形成的角度和各線段相互間的 $\cos\theta$ 角度大小。
- 6. 面積(A) 如圖 3 N 型波浪基本屬性中, 計算各線段和 X 軸所形成的直角 三角形面積和連續三點 P1P2P3、P2P3P4 形成的面積大小。

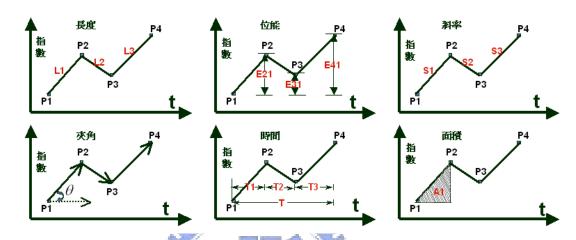


圖 8 N型波浪的各種物理力量範例

由於股市的波動的物理力量定義和物理力學概念並不全然相同,本研究嘗試針對物理運動過程以泰勒展開式的一階動量、二階動量所代表的速度和加速度,來分析這些力量形成的能量對股價的影響,並以這些相關變數當成類神經網路的輸入變數。計算方式如下:

1. 資料比例:

$$rX_{i,j} = \frac{X_i}{X_j} \tag{2}$$

Xi=變數X裡面的第1個變數

Xi=變數X裡面的第 j個變數

2. 一階動量:

$$X'_{ij} = dX_{i,j} = \frac{X_i - X_j}{X_i}$$
 (3)

 $X_i =$ 變數X裡面的第i個變數 $X_j =$ 變數X裡面的第j個變數

3. 二階動量:

$$X_{iimk}^{"} = d2X_{ii.mk} = X_{ii}^{'} - X_{mk}^{'}$$

(4)

Xi=變數X裡面的第i個變數

Xi=變數X裡面的第 j個變數

Xm=變數X裡面的第m個變數

Xk=變數X裡面的第k個變數

本研究所使用的變數即為上述公式所計算出來六個構面物理力量輸入變數如下表示。

表 1 六個構面的物理力量

面向	變數名稱
長度(L)	L1, L2, L3
	rL21, rL31, rL32
	dL21, dL31, dL32
	d2L3221, d2L3231, d2L3121
斜率(S)	S1, S2, S3
	rS21, rS31, rS32
	dS21, dS31, dS32
	d2S3221, d2S3231, d2S3121
夾角(An)	An1, An2, An3, AnL12, AnL13, AnL23
	rAn21, rAn31, rAn32, rAnL1213, rAnL1223, rAnL1323
	dAn21, dAn31, dAn32, dAnL1213, dAnL1223, dAnL1323
	d2An3221, d2An3231, d2An3121
	d2AnL13231213, d2AnL13231223, d2AnL12231213
面積(A)	A1, A2, A3, 3PA1, 3PA2
	rA21, rA31, rA32, r3PA21
	dA21, dA31, dA32, d3PA21
	d2A3221, d2A3231, d2A3121
位能(E)	rE21, rE31, rE41, rE32, rE42, rE43
	dE21, dE31, dE41, dE32, dE42, dE43
	d2E4332, d2E3221, d2E4342, d2E4341, d2E4321,
	d2E4231, d2E4221
時間(T)	T1, T2, T3
	rT21, rT31, rT32
	dT21, dT31, dT32
	d2T3221, d2T3231, d2T3121

3.2.5 輸出變數

本實驗所預測之輸出變數為 rE54,即所預測之 N 型波的第五波位能與第四波位能的相對值,由於輸入變數皆為不具單位的相對值,因此輸出變數也必須是不具單位的相對值方能預測。

$$rE_{54} = \frac{E_5}{E_4} \tag{5}$$

3.2.6 資料正規化

資料前置處理包含了N型轉折點的抓取、資料過濾、資料正規化,首先在N型轉折點的抓取實驗所需之N型資料,總共有2781個N型的資料,前16年為訓練期資料,後六年為測試期資料。

由於 N 型資料抓取方式的關係,這 2781 筆資料中有許多是不適合當作訓練資料的,包含了重複的 N 型以及不同的 N 型卻產生同樣的結果的資料,剔除這些不適合的資料後,訓練的資料筆數如下表

訓練期 測試期年份 1987~2002 2003~2009

資料筆數 1085 518

表 2 實驗資料筆數

實驗資料確定以後,為配合類神經網路運算時避免超過活化函數(activation function)可處理的範圍,因此在輸入網路前必須做縮放的正規化處理以符合類神經元的輸出。由於輸出的資料型態也是正規化後的型態,必須去正規化方能對預測結果做分析,因此在正規化的同時,會紀錄一個正規化的對應表,方便實驗結果的去正規化。

在神經網路運算時,輸入資料最大最小值有時為極值,可能會超過活化函數 (activation function)可處理的範圍,因此在輸入網路前必須做縮放的正規化處理以符合類神經元的輸出,本研究將網路的輸入資料作一次正規化、二次正規化,以求取網路學習與收斂。

根據邱憶如[41]提到,資料必須做一次正規化的前置處理,是因為各輸入值 之範圍不盡相同,權重之調整無法消除大值之影響,因此各輸入變數在輸入至子 網路前必須正規化使其範圍介於 0 與 1。而在二次正規化將輸入資料取二次正規 化是由於經由一次正規化的資料值,出現了因為分母過大而造成極值,使正規化 後之值大部份群聚在某一區間內,在小數點後幾位才有差異,無法突顯資料有何 顯著性不同,類神經無法學習,因此將一次正規化後的資料,排序後,分成一百 等分,分別將映射至每個百分比,使資料能平均分配,加強神經網路學習成效。

林蒼祥&蔡蒔銓[42]提出物理學在財務金融方面的卓越貢獻,而金融物理學的發展在近十年也漸漸的為國外所接受,而周煒星(民國 96 年)對金融物理學下了以下的闡釋:以統計物理和理論物理的方法和工具研究金融市場的新興交叉學科,其主要的研究方向包括:金融系統的統計規律,特別是其中具有普適性的標度律;證券的相關性、極端事件、金融風險管理和投資組合;宏觀市場的建模和預測;微觀市場動力學模型,包括伊辛模型、少數者博弈模型等。除此之外,許多國外知名物理期刊,如 The European Physical Journal B 也有許多學者將物理學的模型以及概念應用在金融市場上面,代表物理力量的概念在金融市場確有其影響,因此同時考量物理行為變化,也就是每個輸入變數之變動量,除了座標以及向量,其餘輸入參數皆做一階變量處理。

在輸入變數上面,必須先做一些事先的處理,使的 BPN 訓練的效果提升以及方便解讀,這些事先處理包含以下:

1. 一階正規化

因為各輸入值之範圍不盡相同,權重之調整無法消除大值之影響,因此 各輸入變數在輸入至子網路前必須正規化使其範圍介於 0 與 1,其正規 化之計算方法如下:

$$X_i = \frac{X_i - \min(X)}{\max(X) - \min(X)}$$
 $X_i =$ 變數X裡面的第 i 個變數
 $Min(X) =$ 全部 X 變數當中最小的
 $Max(X) =$ 全部 X 變數當中最大的

2. 二階正規化

將輸入資料取二次正規化是由於經由一次正規化後,資料呈現常態分佈 現象,使正規化後之值大部份群聚在某一區間內,在小數點後幾位才有 差異,無法突顯資料有何顯著性不同,倒傳遞類神經學習效果不佳,因 此將一次正規化後的資料,排序後,分成一百等分,分別將映射至每個 百分比,使資料能平均分配,加強神經網路學習成效。其計算方法如下:

$$X_{I}^{"} = \frac{Integer[\frac{tag[x_{1}^{f}]}{Total(x^{t})} \times 100]}{100}$$
(7)

X_i=將變數Xi做過一次正規化後的值 Tag=將變數X由小到大排序後變數Xi所在的位置 Total=所有 X 變數的個數 Integer=將括弧內的值無條件捨去取整數

3.3 輸入變數篩選

本實驗輸入參數包含了六個構面的物理力量,分別是時間、斜率、面積、線段長度、位能以及夾角,每個構面的物理力量都有不同的組合,因此總共有95個不同的變數,然而為了避免不必要的資訊輸入神經網路過度學習影響預測結果,勢必要先過濾掉不必要的輸入變數,找出真正會影響股市走勢的變數,提高預測準確率。

輸入變數 $rX_{i,j}$ 和 $dX_{i,j}$ 在一階正規化後,因為其排序順序是相同所以二階 正規化後得到相同的值,首先過濾掉 $rX_{i,j}$ 只保留 $dX_{i,j}$ 。再將剩餘的輸入變數依照 資料構面的區分,輸入變數的篩選最好的方法為逐步篩選法,俗稱暴力法;將每 個訓練期的變數排列組合排列都放入神經網路訓練,選出最佳結果的來測試,但 n 維的特徵變數總共有 2^n-1 種變數組合情形,當n 為 95 時共有 $2^{95}-1$ 情形, 所需花費的時間會非常驚人, 有限的時間內恐怕無法完成。衡量時間與實驗效 率,本實驗採用改良式逐步篩選法。步驟如下:

- 1. 依構面分類:依輸入參數的構面的不同分門別類成六個群組
- 2. 建立排列組合選項: 排列組合所有的群組共有 63 種
- 3. 類神經網路訓練
 - (1) 逐步選取排列組合中的一種進行類神經網路訓練
 - (2) 所有群組之構面內所有變數皆放入進行訓練
 - (3) 類神經網路設定不變
- 4. 跳回步驟 3, 直到所有排列組合皆完成
- 5. 進行輸入變數的篩選
 - (1) 進行績效評估
 - (2) 篩選出最有影響力的輸入參數

下圖為本研究的篩選流程:

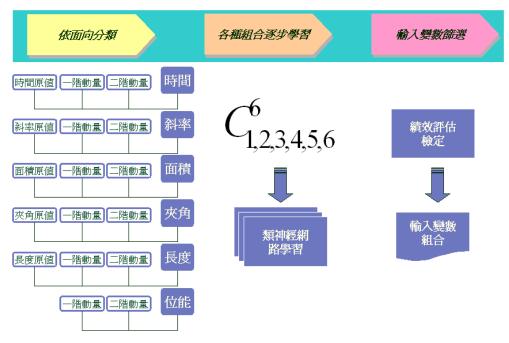


圖 9 改良式逐步篩選法

經由類神經網路績效評估,發現六個輸入構面中變數-面積對類神經網路的 學習和績效表現影響最小,剔除面積構面的變數後總共得到輸入變數共有 58 個。如下表所示:

表 3 篩選後的輸入變數

イ /- 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
面向 變數名稱	
長度(L) L1, L2, L3	
dL21, dL31, dL32	
d2L3221, d2L3231, d2L3121	
斜率(S) S1, S2, S3	
dS21, dS31, dS32	
d2S3221, d2S3231, d2S3121	
夾角(An) An1, An2, An3, AnL12, AnL13, AnL23	
dAn21, dAn31, dAn32, dAnL1213, dAnL1223, dAn	L1323
d2An3221, d2An3231, d2An3121	
d2AnL13231213, d2AnL13231223, d2AnL1223	1213
位能(E) dE21, dE31, dE41, dE32, dE42, dE43	
d2E4332, d2E3221, d2E4342, d2E4341, d2E43	21,
d2E4231, d2E4221	
時間(T) T1, T2, T3	
dT21, dT31, dT32	
d2T3221, d2T3231, d2T3121	

3.4 評估模式

3.4.1 準確率計算

本實驗輸入以及輸出變數因為正規化緣故,皆為0~1,當預測值越接近0,代表位能E5相對於位能E4越小,亦即為下跌之趨勢,反之亦然,當預測值越接近1,代表指數的走勢為上漲。考慮到交易策略與獲利的可能,本實驗的準確率計算方式為將預測值反正規化後分為四個區間,以零點為分界並以-7%跟7%為門檻,區間一:小於-7%代表大跌,以F1代表之;區間四:大於7%代表大漲,以F4代表之,區間二、區間三:介於-7%和7%間則為F2、F3。當目標值為大漲且預測值為大漲即算預測準確,反之,當目標值大跌且預測值為大跌也算預測準確,分別計算大漲以及大跌的預測準確率:

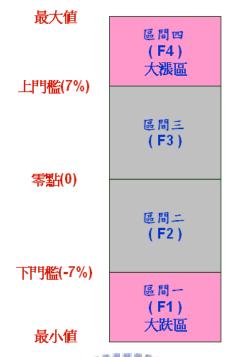


圖 10 預測值分區

3.4.2 交易策略

本研究的預測的目的是當確定股市走勢的時候,利用N型指標判斷接下來的走勢是否會大漲大跌,然而大漲或是大跌幾點在本實驗中並沒有辦法準確預估,因此必須配合交易策略來進行操作,方能獲利。由於本研究的實驗資料為台灣股市大盤加權指數,因此在交易上都以近月台指期為操作標的,以下是本實驗的交易策略:

- 1. 作多:當預測訊號為大漲時,作多一口近月台指期貨。
- 2. 放空:當預測訊號為大跌時,放空一口近月台指期貨。
- 3. 停利點:當大漲或是大跌超過前一個轉折點的7%即立刻平倉。
- 4. 停損點:當走勢與預期方向相反,且反方向走勢的幅度超過前一個轉折 點的2%。

3.4.3 投資績效評估方法

進行金融市場大盤指數走勢的預測最終的目的是要獲利,除了交易策略的制定以外,尚須測量進行交易時的投資績效。

由於本研究的預測目標為台灣大盤加權指數,而投資標的物為跟台灣大盤加權指數有連動關係的台指期貨,雖然彼此會因為時間或是其他因素有點數上的差距,但是基本上差距不大,本研究假設台灣大盤加權指數與台指期貨的點數在任何時刻皆相同且等於大盤加權指數,以方便計算獲利。

當手上擁有的部位進行平倉的動作時,即計算一次獲利率,取每次獲利的平

均以及獲利的標準差來評估投資績效好壞。由於 N 型指標必須在轉折點確定以後方可預測下一波的走勢,在轉折點的判斷上,採用類似交易策略停損點的方式,也就是當加權指數走勢反轉的時候,如果反轉的點數超過反轉點的 2%,即視此反轉點為一轉折點,開始進行預測。獲利率的計算方式如下:

手續費包含了交易稅以及券商收取的手續費,由於是模擬電子交易,目前市場上台指期貨一口的手續費約為 100~150 元,交易稅為 10 萬分之 4,為求計算方便,設定每次進出場的手續費加上交易稅為 5點。台灣期貨交易所於 2009 年5月5日交易時段結束後實施原始保證金與維持保證金的更動,將原本原始保證金由 111000 元新台幣調整為 114000 元新台幣,而維持保證金也由 86000 元新台幣調整至 87000 元新台幣,因為測試期間為 2003~2009,因此本研究採用舊制的保證金制度。由於交易時會有掛單價格與成交價格不一樣的狀況,本研究假設掛單價格皆能成交且立即成交。

3.4.4 對照組投資績效評估方法

對照組採用隨機漫步模式,當實驗組出現進場訊號時,對照組也同時進場但 是以隨機方式進場作多或放空,而停利點和停損點採用和對照組相同。

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第四章 實驗結果與分析

4.1 實驗設計

Zhang(1998)指出具有單一隱藏層之類神經網路即可達到可靠之精確度,並 說明單一隱藏層為現今倒傳遞類神經網路最普遍之架構,因此本實驗倒傳遞類神 經網路之隱藏層數皆為一層。

在隱藏節點數方面,有(葉怡成,2003) 隱藏層單元數目 =輸入層單元數 *輸出層單元數)^{1/2} 及Davies(1994)認為沒有速成之方法可以決定,必須透過試誤法(Trial and Error)才可找到最適合之節點個數。然而本實驗採取此方法做測試,分別使用 2 到 100 個隱藏節點數來測試各個子網路,結果發現除了當節點數小於 3 個時,網 路之誤差較不容易收斂外,其他個數皆可使網路學習順利收斂。此外,在本實驗中改變隱藏節點個數對預測結果之影響並不顯著,而愈多之隱藏節點個數僅會造成愈長之學習時間,因此本實驗之隱藏層節點數採用隱藏層單元數目 =輸入層單元數 *輸出層單元數)1/2 為 7 個。

 相關參數
 値

 應該層數目
 1

 應該層神經元數目
 7

 學習速率(初值,降率,終值)
 (1,0.999,0.001)

20000

表 4 倒傳遞類神經網路參數設定

實驗訓練期間總共有 1085 筆資料,測試期間則有 518 筆資料,重覆實驗本研究提出模型和對照組各 100 次。

學習循環次數

4.2 實驗結果與分析

本研究的倒傳遞類神經網路分為訓練和測試二階段,訓練階段使用訓練期資料 1085 筆、測試階段使用測試期資料 518 筆資料。

4.2.1 準確率實驗結果

下表為準確率實驗結果:

表 5 預測漲跌準確率

			預測正確	預測數	準確率
		預測大漲	248	315	78.73%
訓練	期	預測大跌	272	348	78.16%
	預測大漲或大跌	520	663	78.43%	
		預測大漲	77	114	67.54%
測試	期	預測大跌	68	93	73.12%
		預測大漲或大跌	145	207	70.05%

由上表可得知,測試期預測其走勢為大漲或是大跌的準確率超過 70%、預測 其走勢為大漲的準確率 67%、預測其走勢為大跌的準確率 73%。

4.2.2 投資績效實驗結果

投資績效分析的部分分成兩部分來看,第一部分為大漲的部分,第二部分為大跌的部分,轉折點的判斷方式如前面章節所述當加權指數走勢反轉的時候,如果反轉的點數超過反轉點的 2%,即視此反轉點為一轉折點,開始進行預測。當系統預測接下來的走勢為大漲或是大跌,即開始進行交易,如果預測結果是大漲則對台指期貨做做多的動作,大跌則放空,以下是測試期共 518 筆資料的投資測試結果:

下表為投資績效實驗結果:

表 6 預測大漲或大跌之投資績效

	(m		
(大漲或大跌)	預測成功	預測失敗	平均
平均獲利率	53.48%	-22.93%	32.07%
平均獲利點數	297	-127	178
平均獲利金額	59,366	-25,452	35,600
最高獲利率	87.24%	-15.61%	
最低獲利率	33.75%	-34.89%	
最高獲利點數	484	-86	
最低獲利點數	187	-193	

在測試期預測為大漲或大跌超過門檻值有效訊號總共有207次,因此共進行207次交易,而成功預測的情況有145次,失敗次數為62次;每次平均獲利率為32.07%,每次平均獲利點數為178點,每次平均獲利金額為35,600元。

表 7 預測大漲之投資績效

(預測大漲)	預測成功	預測失敗	平均
平均獲利率	50.79%	-23.06%	29.41%
平均獲利點數	282	-128	163
平均獲利金額	56,378	-25,601	32,647
最高獲利率	78.42%	-15.61%	
最低獲利率	33.75%	-34.89%	
最高獲利點數	435	-87	
最低獲利點數	187	-194	

在測試期預測為大漲超過門檻值有效訊號總共有 114 次,因此共進行 114 次交易,而成功預測的情況有 77 次,失敗次數為 37 次;每次平均獲利率為 29.41%,每次平均獲利點數為 163 點,每次平均獲利金額為 32,647 元。

表 8 預測大跌之投資績效

(大跌)	預測成功	預測失敗	平均
平均獲利率	56.69%	-22.75%	35.33%
平均獲利點數	315	-126	196
平均獲利金額	62,925	-25,257	39,220
最高獲利率	87.24%	-16.28%	
最低獲利率	37.48%	-34.04%	
最高獲利點數	484	-90	
最低獲利點數	208	-189	

在測試期預測為大跌超過門檻值有效訊號總共有93次,因此共進行93次交易,而成功預測的情況有68次,失敗次數為25次;每次平均獲利率為35.33%,每次平均獲利點數為196點,每次平均獲利金額為39,220元。

由以上結果可以看出,在518筆測試期資料當中,共有207次的交易機會, 而當中有145次是能夠準確預測接下來的走勢是大漲或是大跌,代表利用物理力 量透過類神經網路的訓練可以掌握相當程度的漲跌幅趨勢。

4.3 統計檢定

本研究的研究目的為證明市場中具有所謂的物理力量能夠影響股市的走勢,實證效率市場假說的不合理;可從兩個構面來證明,首先,如果依照本實驗模型,利用物理力量當作神經網路的輸入值來預測股市的走勢如果經過統計檢定

顯著大於效率市場的隨機漫步模式,則股市並非如效率市場假說班為隨機漫步,另一方面,若能夠利用統計檢定證明本實驗模型之獲利顯著大於隨機漫步模式,也就是勝過大盤的獲利,亦可證明股市並非具有絕對的效率。

4.3.1 檢定大漲或大跌的準確率是否高於隨機漫步的準確率

首先檢定實驗組(本研究模型)和對照組(隨機漫步)在顯著水準 α =0.05 下的準確率變異數是否相等 (F 檢定),實證資料如(附錄 A.1 本研究實驗組和對照組預測準確率)。

 $\mathbf{H}_0: \boldsymbol{\sigma}_1^2 = \boldsymbol{\sigma}_2^2$

 $\mathbf{H}_1: \, \boldsymbol{\sigma}_1^2 \neq \boldsymbol{\sigma}_2^2$

表 9 預測大漲或大跌之準確率變異數 F 檢定

F 檢定:兩個常	態母體變異數	的檢定
	變數 1	變數 2
平均數	0.64576986	0.501089983
變異數	0.000596382	0.001093452
觀察值個數	100	100
自由度	99	99
F	0.545412027	
P(F<=f) 單尾	0.00141438	
臨界值:單尾	0.717328419	

由上表,得到雙尾F檢定之p值=0.00141438x2=0.00282876,小於 α =0.05,表示在顯著水準 α =0.05下 拒絕虛無假設(H_0 : $\sigma_1^2=\sigma_2^2$),也就是實驗組和對照組準確率的變異數是不相等的。

接著檢定實驗組和對照組在顯著水準 $\alpha=0.05$ 下準確率的平均數是否相等? (t 檢定),實證資料如(附錄 A.1 本研究實驗組和對照組預測準確率)。

 $H_0 : u_1 \leq u_2$

 $H_1 : u_1 > u_2$

表 10 預測大漲或大跌之準確率平均數 t 檢定

t 檢定:兩個母體平均數差的檢定,假設變異數不相等			
	變數 1	變數 2	
平均數	0.64576986	0.501089983	
變異數	0.000596382	0.001093452	
觀察值個數	100	100	
假設的均數差	0		
自由度	182		
t 統計	35. 19541949		
P(T<=t) 單尾	1.94084E-83		
臨界值:單尾	1.653270374		
P(T<=t) 雙尾	3.88169E-83		
臨界值:雙尾	1.973085091		

由上表,得到雙尾t檢定之單尾p值=1.94084E-83,小於 α =0.05,表示在顯著水準 α =0.05下 拒絕虛無假設($H_0: u_1 \le u_2$),也就是實驗組準確率的平均數大於對照組。也證明了透過物理力量可以找出股市中的行為來預測股市的走勢,效率市場假說在本研究中並不符合。

4.3.2 檢定大漲的準確率是否高於隨機漫步的準確率

首先檢定實驗組(本研究模型)和對照組(隨機漫步)在顯著水準 α =0.05下的準確率變異數是否相等(F檢定),實證資料如(附錄 A.1 本研究實驗組和對照組預測準確率)。

 $\mathbf{H}_0 : \boldsymbol{\sigma}_1^2 = \boldsymbol{\sigma}_2^2$

 $\mathbf{H}_1: \, \boldsymbol{\sigma}_1^2 \neq \boldsymbol{\sigma}_2^2$

表 11 大漲之準確率變異數 F 檢定

F 檢定: 兩個常態母體變異數的檢定			
	變數 1	變數2	
平均數	0.640908	0.49746235	
變異數	0.000587	0.00167738	
觀察値個數	100	100	
自由度	99	99	
F	0.35021		
P(F<=f) 單尾	1.7E-07		
臨界値: 單尾	0.717328		

由上表,得到雙尾F檢定之p值=1.7E-07 x 2=3.4E-07,小於 α =0.05,表示在顯著水準 α =0.05 下 拒絕虛無假設(H_0 : $\sigma_1^2=\sigma_2^2$),也就是實驗組和對照組準確率的變異數是不相等的。

接著檢定實驗組和對照組在顯著水準 $\alpha=0.05$ 下準確率的平均數是否相等? $(t \, \text{檢定})$,實證資料如 $(\text{附錄 A.1} \, \text{本研究實驗組和對照組預測準確率})。$

 $H_0: u_1 \leq u_2$

 $H_1 : u_1 > u_2$

表 12 大漲準確率之平均數 t 檢定

t 檢定:兩個母體平均數差的檢定,假設變異數不相等				
	變數1	變數2		
平均數	0.64090763	0.497462352		
變異數	0.000587436	0.001677379		
觀察値個數	100	100		
假設的均數差	0			
自由度	161			
t 統計	30.14185098			
P(T<=t) 單尾	2.14382E-68			
臨界値: 單尾	1.654373136			
P(T<=t) 雙尾	4.28765E-68			
臨界値: 雙尾	1.974808583			

由上表,得到雙尾t檢定之單尾p值=2.14E-68,小於 α =0.05,表示在顯著水準 α =0.05下 拒絕虛無假設($H_0:u_1\leq u_2$),也就是實驗組預測大漲準確率的平均數大於對照組。

4.3.3 檢定大跌的準確率是否高於隨機漫步的準確率

首先檢定實驗組(本研究模型)和對照組(隨機漫步)在顯著水準 α =0.05下的準確率變異數是否相等(F檢定),實證資料如(附錄 A.1 本研究實驗組和對照組預測準確率)。

 $\mathbf{H}_0 : \boldsymbol{\sigma}_1^2 = \boldsymbol{\sigma}_2^2$

 $\mathbf{H}_1: \, \boldsymbol{\sigma}_1^2 \neq \boldsymbol{\sigma}_2^2$

表 13 大跌之準確率變異數 F 檢定

F 檢定:兩個常態母體變異數的檢定			
	變數 1	變數2	
平均數	0.65192235	0.5046142	
變異數	0.00135503	0.0028964	
觀察値個數	100	100	
自由度	99	99	
F	0.4678266		
P(F<=f) 單尾	9.73E-05		
臨界値:單尾	0.71732842		

由上表,得到雙尾F檢定之p值=9.73E-05 x 2=1.9E-04,小於 α =0.05,表示在顯著水準 α =0.05 下 拒絕虛無假設(H_0 : $\sigma_1^2=\sigma_2^2$),也就是實驗組和對照組準確率的變異數是不相等的。

接著檢定實驗組和對照組在顯著水準α=0.05下準確率的平均數是否相等? (t檢定),實證資料如(附錄 A.1 本研究實驗組和對照組預測準確率)。

H₀ i u₁ ≤ u₂

H₁ : u₁ > u₂

表 14 大漲準確率之平均數 t 檢定

S				
t 檢定:兩個母體平	t 檢定:兩個母體平均數差的檢定,假設變異數不相等			
	變數 1	變數 2		
平均數	0.65192235	0.504614241		
變異數	0.001355026	0.002896429		
觀察值個數	100	100		
假設的均數差	0			
自由度	175			
t 統計	22. 59216574			
P(T<=t) 單尾	4. 59558E-54			
臨界值:單尾	1.653606887			
P(T<=t) 雙尾	9. 19115E-54			
臨界值:雙尾	1. 973612598			

由上表,得到雙尾t檢定之單尾p值=4.59E-54,小於 $\alpha=0.05$,表示在顯著水準 $\alpha=0.05$ 下 拒絕虛無假設($H_0:u_1\leq u_2$),也就是實驗組預測大跌準確率的平均數大於對照組。

4.3.4 本研究模型與隨機漫步之獲利率

除了準確率的檢定以外,亦可檢定投資報酬率是否勝過隨機漫步模式來檢驗本實驗是否成功,根據 Levy(1966)在技術分析理論中指出,超額報酬必須存在於一段長期時間內。測試期間總共有6年,如果此6年的平均報酬勝過大盤即代表本研究利用N型波浪指標的物理力量來判斷股市走勢的實驗是成功的。

首先檢定實驗組(本研究模型)和對照組(隨機漫步)在顯著水準 α =0.05 下的 準確率變異數是否相等(F 檢定),實證資料如(附錄 A.2 本研究實驗組和對照組投 資績效)。

$$\mathbf{H}_0 : \boldsymbol{\sigma}_1^2 = \boldsymbol{\sigma}_2^2$$

$$\mathbf{H}_1: \sigma_1^2 \neq \sigma_2^2$$

表 15 本研究模型與隨機漫步之獲利率變異數 F 檢定

F 檢定:兩個常	態母體變異數的	檢定
	變數 1	變數 2
平均數	0.273619247	0.039679752
變異數	0.000396581	0.000336145
觀察值個數	100	100
自由度	99	99
F	1.179791658	
P(F<=f) 單尾	0.206106443	
臨界值:單尾	1.394061755	

由上表,得到雙尾F檢定之p值=0.206 x 2=0.41,大於 α =0.05,表示在顯著 水準 α =0.05 下 不能推翻虛無假設(H_0 : $\sigma_1^2 = \sigma_2^2$),也就是實驗組和對照組準確 率的獲利率變異數是相等的。

接著檢定實驗組和對照組在顯著水準 $\alpha=0.05$ 下準確率的平均數是否相等? $(t \, dc)$,實證資料如(附錄 A.2 本研究實驗組和對照組投資績效)。

 $H_0 : u_1 \leq u_2$

 $H_1 : u_1 > u_2$

表 16 本研究模型與隨機漫步之獲利率 t 檢定

t 檢定:兩個母體平	均數差的檢定,假	.設變異數相等
	變數 1	變數 2
平均數	0.273619247	0.039679752
變異數	0.000396581	0.000336145
觀察值個數	100	100
Pooled 變異數	0.000366363	
假設的均數差	0	
自由度	198	
t 統計	86. 42365527	
P(T<=t) 單尾	1.7755E-159	
臨界值:單尾	1.652585979	
P(T<=t) 雙尾	3. 551E-159	
臨界值:雙尾	1.972016435	

由上表,得到雙尾t檢定之單尾p值=1.77E-159,小於 α =0.05,表示在顯著水準 α =0.05下 拒絕虛無假設 $(H_0: u_1 \le u_2)$,也就是實驗組獲利率平均數大於對照組。

綜合本小節兩種檢定方法,其一為檢定預測準確率是否大於隨機預測的準確 度,此檢定的意義在於驗證本研究方法的準確度是否明顯高於隨機預測的準確 度,結果是肯定的;第二項檢定為檢定獲利率是否比隨機交易的方法高,此檢定 的意義在於驗證本研究方法在獲利上面是否能夠打敗隨機操作模式,大盤,長期 獲取超額的利潤,檢定結果也是肯定的。

第五章 結論與建議

5.1 研究結論

本研究的分析證實了股市的走勢的確會受到物理力量的影響,透過一連串的物理力量的篩選,倒傳遞類神經網路的學習,本研究的模型相較於一般傳統財務金融所假設的效率市場假說有顯著的差異,整理本研究的各個實驗分析,歸納出以下幾點結論:

1. 艾略特波浪理論的轉折,藉由本研究驗證確實有波段的行為。

本研究所提出的N型指標利用轉折點的概念,在轉折點確定後預測接下來的走勢會不會有大波動的準確度相當不錯,這個N型指標的概念源自於艾略特波浪理論,在艾略特波浪理論當中認為股市的走勢分成攻擊波與修正波,N型指標的大漲大跌有某種程度等同於艾略特波浪理論的轉折攻擊波,在屬於攻擊波的情況下預測的準確度明顯提高,間接證明了艾略特理論的攻擊波的概念有一定程度的波段行為。

2. 金融工程物理學行為的發現

本研究利用波浪的力學性質(長度、夾角、斜率、位能、時間)當做倒傳遞類神經網路的輸入值,經過倒傳遞類神經網路的訓練與學習,預測台灣加權指數走勢,其預測結果的準確度透過統計的驗證,證實有明顯高於隨機預測的準確度,換句話說,股市趨勢的消長確實可用這些物理行為來解釋,這是以往文獻當中比較少做研究分析的一部份。

3. 台灣的金融市場並不符合傳統財務金融學說的效率市場假說

如果金融市場的走勢如同傳統財務金融學說符合效率市場假說,那麼無論在 任何時候都沒有辦法以過去的資訊來預測未來的走勢,然而本研究利用台灣 加權指數物理力量的歷史資料結合倒傳遞類神經網路來預測漲跌幅的大小, 經過實驗與統計分析,證實本研究的預測準確率顯著的大於五成,也就是並 非隨機的變動。同時,在效率市場假說的前提下,在長期的投資下,投資的 效益是沒辦法超過大盤,在投資效益的檢定下也不符合這個假設。

5.2 研究後續建議

關於本研究的未來可能方向,則有下列幾點建議:

1. 本論文僅從價格的波型探討,並未考慮到量之動能,未來後進可以考慮加入 其市場量能之物理量一併研究

本研究很重要的一個目的是證明物理力量存在於金融市場當中,且能夠從這些物理行為去推斷或是找出金融市場的一些模式與趨勢,然而影響金融市場的並不只是價格的物理力量,還包含了其他很多因素,就加權指數而言,許多學者所建立的技術指標和成交量也有其一定的預測能力或是提供一定的資訊,因此若是能夠加入其他有用的技術指標,相信對於本研究模型的預測能力改善是會有相當的幫助的。

2. 輸入參數的篩選

本研究輸入參數的篩選,為了避免以個別變數排列組合的海量計算而採用事先的變數分群雖然減少了計算量但也損失了準確度,後續的研究可以借重雲端運算做全面性的模擬(Simulation),相信對於本研究模型的參數篩選是會有相當的幫助的。

ومتالللاه

3. 原始資料的選取

本研究只擷取台灣加權指數日K線為實驗資料,先抓取N型資料,接著經過資料處理後當作輸入變數給倒傳遞類神經網路學習,所求得的預測值走勢往往是屬於中短期的走勢,如一個禮拜到兩個禮拜的走勢預測,這樣的優點是交易並不用派頻繁的執行,單次進出的報酬理論上也會比較多;然而在研究背景有提到,台灣是一個淺碟式的經濟體系,整個金融市場很容易受到各種外力所影響,例如政策的改變或是新聞消息的炒作,因此當在收盤期間有足以影響股市的消息出現,很難採取因應的措施來保護所持有的部位,因此如果能夠以日內的交易資料取代日K的資料,勢必可以降低這種非系統風險,同時也減少歷史資料中因隔夜消息導致市場趨勢未依照正常情況下的風險,讓訓練資料夠加精確。

4. 預測目標

本研究模型的預測目標為末來波浪的大走勢,並沒有考慮到時間的因素,走勢時間的長短也是金融市場操作很重要的一個部分,未來再加上走勢時間的預測值,可以提高模型的可用度。

5. 本論文並未對初期資料之正規化做更有效率之分群,未來後進可以其他分群之模型,加以分類,可能可以增加其準確性

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附 錄

A.1. 本研究實驗組和對照組預測準確率

本附錄為實驗100次的預測準確率。欄位F1為實驗組預測大跌次數,欄位F4為實驗組預測大漲次數,欄位F1Acc1為實驗組預測大跌準確次數,欄位F4Acc1為實驗組預測大漲或大跌準確率,欄位F1Acc1Rate為實驗組預測大漲或大跌準確率,欄位F1Acc1Rate為實驗組預測大漲準確率,欄位F4Acc1Rate為實驗組預測大漲準確率,欄位F4Acc1Rate為實驗組預測大漲準確率;RandF1Acc,RandF4AccRate以隨機漫步的對照組準確率。

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TeskID	File Typ	F1	F4	F1Acc1	F4Acc1	Acc1Rate	F1Acc1Ra	F4Acc1Ra	Rand1Acc	Rand4Acc	RandAccR	Rand1Acc	Rand4AccR
JOB19-BPN09-D08_T22_H7_I40_00001-00001	Train	361	313	279	256	0.793767	0.772851	0.817889	191	144	0.497033	0.529086	0.4600639
JOB19-BPN09-D08_T22_H7_I40_00001-00002	Train	365	324	276	252	0.766327	0.756162	0.777775	191	166	0.518142	0.523288	0.5123457
JOB19-BPN09-D08_T22_H7_I40_00001-00003	Train	365	324	276	252	0.766327	0.756162	0.777775	166	172	0.490566	0.454795	0.5308642
JOB19-BPN09-D08_T22_H7_I40_00001-00004	Train	355	307	273	250	0.790029	0.769012	0.81433	184	163	0.524169	0.51831	0.5309446
JOB19-BPN09-D08_T22_H7_I40_00001-00005	Train	366	323	279	264	0.788098	0.762293	0.817335	188	166	0.513788	0.513661	0.5139319
JOB19-BPN09-D08_T22_H7_I40_00001-00006	Train	365	324	276	252	0.766327	0.756162	0.777775	187	169	0.516691	0.512329	0.5216049
JOB19-BPN09-D08_T22_H7_I40_00001-00007	Train	365	324	276	252	0.766327	0.756162	0.777775	184	176	0.522496	0.50411	0.5432099
JOB19-BPN09-D08_T22_H7_I40_00001-00008	Train	353	326	266	259	0.773195	0.753539	0.794476	161	159	0.471281	0.456091	0.4877301
JOB19-BPN09-D08_T22_H7_I40_00001-00009	Train	341	336	270	263	0.787296	0.791787	0.782736	166	159	0.480059	0.486804	0.4732143
JOB19-BPN09-D08_T22_H7_I40_00001-00010	Train	347	344	276	261	0.777133	0.795387	0.758719	183	164	0.502171	0.527378	0.4767442
JOB19-BPN09-D08_T22_H7_I40_00001-00011	Train	347	344	276	261	0.777133	0.795387	0.758719	186	174	0.520984	0.536023	0.505814
JOB19-BPN09-D08_T22_H7_I40_00001-00012	Train	387	339	288	265	0.761707	0.744184	0.781709	192	178	0.509642	0.496124	0.5250737
JOB19-BPN09-D08_T22_H7_I40_00001-00013	Train	361	315	274	254	0.781064	0.759001	0.806347	187	160	0.513314	0.518006	0.5079365
JOB19-BPN09-D08_T22_H7_I40_00001-00014	Train	364	318	282	253	0.784456	0.774723	0.795595	180	179	0.526393	0.494505	0.5628931
JOB19-BPN09-D08_T22_H7_I40_00001-00015	Train	338	312	263	253	0.793845	0.778104	0.810895	182	144	0.501538	0.538462	0.4615385
JOB19-BPN09-D08_T22_H7_I40_00001-00016	Train	338	312	263	253	0.793845	0.778104	0.810895	166	172	0.52	0.491124	0.5512821
JOB19-BPN09-D08_T22_H7_I40_00001-00017	Train	353	318	272	256	0.786884	0.770536	0.805029	183	156	0.505216	0.518414	0.490566
JOB19-BPN09-D08_T22_H7_I40_00001-00018	Train	364	358	280	271	0.763157	0.769229	0.756981	176	169	0.477839	0.483516	0.472067
JOB19-BPN09-D08_T22_H7_I40_00001-00019	Train	364	358	280	271	0.763157	0.769229	0.756981	184	176	0.498615	0.505495	0.4916201
JOB19-BPN09-D08_T22_H7_I40_00001-00020	Train	358	344	281	260	0.770654	0.784914	0.755812	172	163	0.477208	0.480447	0.4738372
JOB19-BPN09-D08_T22_H7_I40_00001-00021	Train	358	344	281	260	0.770654	0.784914	0.755812	173	172	0.491453	0.48324	0.5
JOB19-BPN09-D08_T22_H7_I40_00001-00022	Train	378	354	283	271	0.75683	0.748675	0.765535	189	179	0.502732	0.5	0.5056497
JOB19-BPN09-D08_T22_H7_I40_00001-00023	Train	356	312	274	251	0.785927	0.769661	0.804485	193	155	0.520958	0.542135	0.4967949
JOB19-BPN09-D08_T22_H7_I40_00001-00024	Train	376	313	286	255	0.785195	0.760636	0.814694	188	160	0.50508	0.5	0.5111821
JOB19-BPN09-D08_T22_H7_I40_00001-00025	Train	351	319	272	253	0.783581	0.774927	0.793101	180	144	0.483582	0.512821	0.4514107
JOB19-BPN09-D08_T22_H7_I40_00001-00026	Train	361	311	275	254	0.787201	0.761771	0.816718	181	155	0.5	0.501385	0.4983923
JOB19-BPN09-D08_T22_H7_I40_00001-00027	Train	366	322	280	259	0.783429	0.765025	0.804345	173	162	0.486919	0.472678	0.5031056
JOB19-BPN09-D08_T22_H7_I40_00001-00028	Train	353	318	272	256	0.786884	0.770536	0.805029	177	163	0.506706	0.501416	0.5125786
JOB19-BPN09-D08_T22_H7_I40_00001-00029	Train	355	341	277	265	0.778735	0.780279	0.777124	167	162	0.472701	0.470423	0.4750733
JOB19-BPN09-D08_T22_H7_I40_00001-00030	Train	374	345	279	270	0.763559	0.745987	0.782606	185	171	0.495132	0.494652	0.4956522
JOB19-BPN09-D08_T22_H7_I40_00001-00031	Train	374	345	279	270	0.763559	0.745987	0.782606	172	172	0.478442	0.459893	0.4985507
JOB19-BPN09-D08_T22_H7_I40_00001-00032	Train	372	360	279	268	0.747267	0.749998	0.744442	179	180	0.490437	0.481183	0.5
JOB19-BPN09-D08_T22_H7_I40_00001-00033	Train	355	306	276	242	0.78366	0.777463	0.790847	189	144	0.503782	0.532394	0.4705882

TaskID	File Typ	771	F4	T21 A 1	774 6 1	A 1D - 4-	71 A 1D .	D441D.	D 31 A	D 346	D 34 D	D 31 A	D 344 D
JOB19-BPN09-D08_T22_H7_J40_00001-00034	Train	355	345	276	264	0.771427	0.777463	0.765215	181	165	0.494286	0.509859	Rand4AccR 0.4782609
JOB19-BPN09-D08_T22_H7_I40_00001-00035	Train	374	331	282	258	0.765956	0.754009	0.779454	204	164	0.521986	0.545455	0.4954683
JOB19-BPN09-D08_T22_H7_I40_00001-00036	Train	337	325	262	255	0.780966	0.777446	0.784613	163	150	0.47281	0.48368	0.4615385
JOB19-BPN09-D08_T22_H7_I40_00001-00037	Train	369	324	281	258	0.777777	0.761516	0.796294	188	160	0.502165	0.509485	0.4938272
JOB19-BPN09-D08_T22_H7_I40_00001-00038	Train	337	325	262	255	0.780966	0.777446	0.784613	163	161	0.489426	0.48368	0.4953846
JOB19-BPN09-D08_T22_H7_I40_00001-00039	Train	362	340	277	263	0.76923	0.765191	0.773527	186	188	0.532764	0.513812	0.5529412
JOB19-BPN09-D08_T22_H7_I40_00001-00040	Train	369	324	281	258	0.777777	0.761516	0.796294	181	164	0.497835	0.490515	0.5061728
JOB19-BPN09-D08_T22_H7_I40_00001-00041	Train	335	324	261	257	0.786038	0.779102	0.793207	166	183	0.52959	0.495522	0.5648148
JOB19-BPN09-D08_T22_H7_I40_00001-00042	Train	330	319	260	262	0.804313	0.787876	0.821314	151	163	0.483821	0.457576	0.5109718
JOB19-BPN09-D08_T22_H7_I40_00001-00043	Train	367	310	274	246	0.768093	0.746592	0.793546	206	171	0.556869	0.561308	0.5516129
JOB19-BPN09-D08_T22_H7_I40_00001-00044	Train	367	310	274	246	0.768093	0.746592	0.793546	191	155	0.511078	0.520436	0.5
JOB19-BPN09-D08_T22_H7_I40_00001-00045	Train	357	321	279	259	0.793509	0.78151	0.806851	191	152	0.5059	0.535014	
JOB19-BPN09-D08_T22_H7_I40_00001-00046	Train	357	321	279	259	0.793509	0.78151	0.806851	180	156	0.495575	0.504202	0.4859813
JOB19-BPN09-D08_T22_H7_I40_00001-00047	Train	369	336	284	260	0.77163	0.769646	0.773807	172	184	0.504965	0.466125	0.547619
JOB19-BPN09-D08_T22_H7_I40_00001-00048	Train	381	330	290	260	0.773557	0.761153	0.787876	192	172	0.511955	0.503937	0.5212121
JOB19-BPN09-D08_T22_H7_I40_00001-00049	Train	356	341	274	265	0.773313	0.769661	0.777124	181	159	0.487805	0.508427	0.4662757
JOB19-BPN09-D08_T22_H7_I40_00001-00050	Train	356	341	274	265	0.773313	0.769661	0.777124	194	170	0.522238	0.544944	0.4985337
JOB19-BPN09-D08_T22_H7_I41_00001-00001	Train	355	361	280	278	0.779329	0.78873	0.770081	175	204	0.52933	0.492958	0.565097
JOB19-BPN09-D08_T22_H7_I41_00001-00002	Train	355	361	280	278	0.779329	0.78873	0.770081	183	172	0.49581	0.515493	0.4764543
JOB19-BPN09-D08_T22_H7_I41_00001-00003	Train	370	338	281	260	0.764123	0.759457	0.769228	200	182	0.539548	0.540541	0.5384615
JOB19-BPN09-D08_T22_H7_I41_00001-00004	Train	363	307	278	252	0.791044	0.765838	0.820844	172	171	0.51194	0.473829	0.5570033
JOB19-BPN09-D08_T22_H7_I41_00001-00005	Train	339	341	265	261	0.773528	0.781709	0.765394	177	172	0.513235	0.522124	0.5043988
JOB19-BPN09-D08_T22_H7_I41_00001-00006	Train	354	327	272	254	0.772392	0.768359	0.776756	175	167	0.502203	0.49435	0.5107034
JOB19-BPN09-D08_T22_H7_I41_00001-00007	Train	356	323 298	278 263	254 242	0.783504	0.780897 0.778104	0.786375 0.812078	182 158	157 149	0.499264	0.511236 0.467456	0.4860681
JOB19-BPN09-D08_T22_H7_I41_00001-00008	Train	338	307					0.820844	191	149			0.5
JOB19-BPN09-D08_T22_H7_J41_00001-00009 JOB19-BPN09-D08_T22_H7_J41_00001-00010	Train	363 339	319	278 269	252 259	0.791044 0.80243	0.765838	0.81191	188	151	0.522388 0.515198	0.526171 0.554572	0.5179153
JOB19-BPN09-D08_T22_H7_J41_00001-00011	Train	330	319	260	262	0.804313	0.787876	0.821314	180	150	0.508475	0.545455	0.4702194
JOB19-BPN09-D08_T22_H7_I41_00001-00012	Train	363	320	282	256	0.804313	0.776857	0.821314	185	171	0.52123	0.509642	0.534375
JOB19-BPN09-D08_T22_H7_J41_00001-00013	Train	356	312	275	253	0.790418	0.77247	0.810895	182	165	0.519461	0.511236	0.5288462
JOB19-BPN09-D08_T22_H7_I41_00001-00014	Train	363	316	280	253	0.784977	0.771348	0.80063	180	173	0.519882	0.495868	0.5474684
JOB19-BPN09-D08_T22_H7_I41_00001-00015	Train	367	341	283	269	0.77966	0.771115	0.788854	189	172	0.509887	0.514986	0.5043988
JOB19-BPN09-D08_T22_H7_I41_00001-00016	Train	348	315	272	248		0.781607	0.787299	184	150			
			- %	212	2-10	0.104515	0.101001	0.101255	104	150	0.500111	0.525150	0.4101200
TaskID	File Typ		F4			Acc1Rate							Rand4AccR
JOB19-BPN09-D08_T22_H7_I41_00001-00017	Train	348	315	272	248	0.784313	0.781607	0.787299	162	154	0.476621	0.465517	0.4888889
JOB19-BPN09-D08_T22_H7_I41_00001-00017 JOB19-BPN09-D08_T22_H7_I41_00001-00018	Train Train	348 355	315 342	272 278	248 267	0.784313 0.781921	0.781607 0.783096	0.787299 0.780699	162 172	154 153	0.476621 0.466284	0.465517 0.484507	0.4888889 0.4473684
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00019	Train Train Train	348 355 348	315 342 315	272 278 272	248 267 248	0.784313 0.781921 0.784313	0.781607 0.783096 0.781607	0.787299 0.780699 0.787299	162 172 173	154 153 137	0.476621 0.466284 0.467572	0.465517 0.484507 0.497126	0.4888889 0.4473684 0.4349206
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00019 JOB19-BPN09-D08_T22_H7_J41_00001-00020	Train Train Train Train	348 355 348 356	315 342 315 312	272 278 272 275	248 267 248 253	0.784313 0.781921 0.784313 0.790418	0.781607 0.783096 0.781607 0.77247	0.787299 0.780699 0.787299 0.810895	162 172 173 164	154 153 137 161	0.476621 0.466284 0.467572 0.486527	0.465517 0.484507 0.497126 0.460674	0.4888889 0.4473684 0.4349206 0.5160256
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00019 JOB19-BPN09-D08_T22_H7_J41_00001-00020 JOB19-BPN09-D08_T22_H7_J41_00001-00021	Train Train Train Train Train	348 355 348 356 360	315 342 315 312 313	272 278 272 275 280	248 267 248 253 252	0.784313 0.781921 0.784313 0.790418 0.790489	0.781607 0.783096 0.781607 0.77247 0.777776	0.787299 0.780699 0.787299 0.810895 0.805109	162 172 173 164 186	154 153 137 161 151	0.476621 0.466284 0.467572 0.486527 0.500743	0.465517 0.484507 0.497126 0.460674 0.516667	0.4888889 0.4473684 0.4349206 0.5160256 0.4824281
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00020 JOB19-BPN09-D08_T22_H7_J41_00001-00021 JOB19-BPN09-D08_T22_H7_J41_00001-00022	Train Train Train Train Train Train Train Train	348 355 348 356 360 363	315 342 315 312 313 353	272 278 272 275 280 284	248 267 248 253 252 271	0.784313 0.781921 0.784313 0.790418 0.790489 0.775139	0.781607 0.783096 0.781607 0.77247 0.777776 0.782367	0.787299 0.780699 0.787299 0.810895 0.805109 0.767703	162 172 173 164 186 164	154 153 137 161 151	0.476621 0.466284 0.467572 0.486527 0.500743 0.463687	0.465517 0.484507 0.497126 0.460674 0.516667 0.451791	0.4888889 0.4473684 0.4349206 0.5160256 0.4824281 0.4759207
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00019 JOB19-BPN09-D08_T22_H7_J41_00001-00021 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00022	Train Train Train Train Train Train Train Train Train	348 355 348 356 360 363 363	315 342 315 312 313 353 353	272 278 272 275 280 284 284	248 267 248 253 252 271 271	0.784313 0.781921 0.784313 0.790418 0.790489 0.775139	0.781607 0.783096 0.781607 0.77247 0.777776 0.782367 0.782367	0.787299 0.780699 0.787299 0.810895 0.805109 0.767703 0.767703	162 172 173 164 186 164 177	154 153 137 161 151 168 173	0.476621 0.466284 0.467572 0.486527 0.500743 0.463687 0.488827	0.465517 0.484507 0.497126 0.460674 0.516667 0.451791 0.487603	0.4888889 0.4473684 0.4349206 0.5160256 0.4824281 0.4759207 0.490085
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00019 JOB19-BPN09-D08_T22_H7_J41_00001-00021 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00023 JOB19-BPN09-D08_T22_H7_J41_00001-00023 JOB19-BPN09-D08_T22_H7_J41_00001-00024	Train	348 355 348 356 360 363 363 362	315 342 315 312 313 353 353 337	272 278 272 275 280 284 284 276	248 267 248 253 252 271 271 267	0.784313 0.781921 0.784313 0.790418 0.790489 0.775139 0.775139 0.776823	0.781607 0.783096 0.781607 0.77247 0.777776 0.782367 0.762429	0.787299 0.780699 0.787299 0.810895 0.805109 0.767703 0.767703	162 172 173 164 186 164 177 170	154 153 137 161 151 168 173 165	0.476621 0.466284 0.467572 0.486527 0.500743 0.463687 0.488827 0.479256	0.465517 0.484507 0.497126 0.460674 0.516667 0.451791 0.487603 0.469613	0.488889 0.4473684 0.4349206 0.5160256 0.4824281 0.4759207 0.490085 0.4896142
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00019 JOB19-BPN09-D08_T22_H7_J41_00001-00020 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00024	Train	348 355 348 356 360 363 363 362 360	315 342 315 312 313 353 353 353 337 313	272 278 272 275 280 284 284 276 280	248 267 248 253 252 271 271 267 252	0.784313 0.781921 0.784313 0.790418 0.790489 0.775139 0.776823 0.790489	0.781607 0.783096 0.781607 0.77247 0.777776 0.782367 0.762429 0.777776	0.787299 0.780699 0.787299 0.810895 0.805109 0.767703 0.767703 0.792283 0.805109	162 172 173 164 186 164 177 170	154 153 137 161 151 168 173 165 145	0.476621 0.466284 0.467572 0.486527 0.500743 0.463687 0.488827 0.479256 0.488856	0.465517 0.484507 0.497126 0.460674 0.516667 0.451791 0.487603 0.469613 0.511111	0.488889 0.4473684 0.4349206 0.5160256 0.4824281 0.4759207 0.490085 0.4896142 0.4632588
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00019 JOB19-BPN09-D08_T22_H7_J41_00001-00021 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00025	Train	348 355 348 356 360 363 363 362 360 344	315 342 315 312 313 353 353 337 313 312	272 278 272 275 280 284 284 276 280 270	248 267 248 253 252 271 271 267 252 253	0.784313 0.781921 0.784313 0.790418 0.790489 0.775139 0.775139 0.776823 0.790489 0.797255	0.781607 0.783096 0.781607 0.77247 0.777776 0.782367 0.762429 0.777776 0.784881	0.787299 0.780699 0.810895 0.805109 0.767703 0.767703 0.792283 0.805109 0.810895	162 172 173 164 186 164 177 170 184	154 153 137 161 151 168 173 165 145	0.476621 0.466284 0.467572 0.486527 0.500743 0.463687 0.488827 0.479256 0.488856 0.51372	0.465517 0.484507 0.497126 0.460674 0.516667 0.451791 0.487603 0.469613 0.511111 0.494186	0.488889 0.4473684 0.4349206 0.5160256 0.4824281 0.4759207 0.490085 0.4896142
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00019 JOB19-BPN09-D08_T22_H7_J41_00001-00020 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00024	Train	348 355 348 356 360 363 363 362 360	315 342 315 312 313 353 353 353 337 313	272 278 272 275 280 284 284 276 280	248 267 248 253 252 271 271 267 252	0.784313 0.781921 0.784313 0.790418 0.790489 0.775139 0.776823 0.790489	0.781607 0.783096 0.781607 0.77247 0.777776 0.782367 0.762429 0.777776	0.787299 0.780699 0.787299 0.810895 0.805109 0.767703 0.767703 0.792283 0.805109	162 172 173 164 186 164 177 170	154 153 137 161 151 168 173 165 145	0.476621 0.466284 0.467572 0.486527 0.500743 0.463687 0.488827 0.479256 0.488856	0.465517 0.484507 0.497126 0.460674 0.516667 0.451791 0.487603 0.469613 0.511111	0.488889 0.4473684 0.4349206 0.5160256 0.4824281 0.4759207 0.490085 0.4896142 0.4632588 0.5352564
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00019 JOB19-BPN09-D08_T22_H7_J41_00001-00021 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00026 JOB19-BPN09-D08_T22_H7_J41_00001-00026	Train	348 355 348 356 360 363 363 362 360 344 351	315 342 315 312 313 353 353 337 313 312 345	272 278 272 275 280 284 284 276 280 270 268	248 267 248 253 252 271 271 267 252 253 270	0.784313 0.781921 0.784313 0.790418 0.790489 0.775139 0.776823 0.790489 0.797255 0.772987	0.781607 0.783096 0.781607 0.77247 0.777776 0.782367 0.762429 0.777776 0.784881 0.763531	0.787299 0.780699 0.810895 0.805109 0.767703 0.767703 0.792283 0.805109 0.810895 0.782606	162 172 173 164 186 164 177 170 184 170	154 153 137 161 151 168 173 165 145 167	0.476621 0.466284 0.467572 0.486527 0.500743 0.463687 0.488827 0.479256 0.488856 0.51372 0.478448	0.465517 0.484507 0.497126 0.460674 0.516667 0.451791 0.487603 0.469613 0.511111 0.494186 0.498575	0.488889 0.4473684 0.4349206 0.5160256 0.4824281 0.4759207 0.490085 0.4896142 0.4632588 0.5352564 0.457971
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00019 JOB19-BPN09-D08_T22_H7_J41_00001-00021 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00023 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00025 JOB19-BPN09-D08_T22_H7_J41_00001-00025 JOB19-BPN09-D08_T22_H7_J41_00001-00027 JOB19-BPN09-D08_T22_H7_J41_00001-00027	Train	348 355 348 356 360 363 362 360 344 351 364	315 342 315 312 313 353 353 353 337 313 312 345 332	272 278 272 275 280 284 276 280 270 268 276	248 267 248 253 252 271 271 267 252 253 270 264	0.784313 0.781921 0.784313 0.790418 0.790489 0.775139 0.776823 0.790489 0.79255 0.772987 0.775861	0.781607 0.783096 0.781607 0.77247 0.777776 0.782367 0.762429 0.777776 0.784881 0.763531 0.75824	0.787299 0.780699 0.787299 0.810895 0.805109 0.767703 0.767703 0.792283 0.805109 0.810895 0.782606 0.795178	162 172 173 164 186 164 177 170 184 170 175	154 153 137 161 151 168 173 165 145 167 158	0.476621 0.466284 0.467572 0.486527 0.500743 0.463687 0.488827 0.479256 0.488856 0.51372 0.478448 0.482759	0.465517 0.484507 0.497126 0.460674 0.516667 0.451791 0.487603 0.469613 0.511111 0.494186 0.498575 0.46978	0.488889 0.4473684 0.4349206 0.5160256 0.4824281 0.4759207 0.490085 0.4896142 0.4632588 0.5352564 0.457971 0.496988
JOB19-BPN09-D08_T22_H7_J41_00001-00017 JOB19-BPN09-D08_T22_H7_J41_00001-00018 JOB19-BPN09-D08_T22_H7_J41_00001-00019 JOB19-BPN09-D08_T22_H7_J41_00001-00021 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00022 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00024 JOB19-BPN09-D08_T22_H7_J41_00001-00025 JOB19-BPN09-D08_T22_H7_J41_00001-00027 JOB19-BPN09-D08_T22_H7_J41_00001-00027 JOB19-BPN09-D08_T22_H7_J41_00001-00028 JOB19-BPN09-D08_T22_H7_J41_00001-00028	Train	348 355 348 356 360 363 362 360 344 351 364 354	315 342 315 312 313 353 353 337 313 312 345 332 327	272 278 272 275 280 284 276 280 270 268 276 272	248 267 248 253 252 271 271 267 252 253 270 264 254	0.784313 0.781921 0.784313 0.790418 0.790489 0.775139 0.776139 0.790489 0.797255 0.772987 0.775861	0.781607 0.783096 0.781607 0.77247 0.772776 0.782367 0.762429 0.777776 0.784881 0.768331 0.75824 0.768339	0.787299 0.780699 0.787299 0.810895 0.806109 0.767703 0.767703 0.792283 0.806109 0.810895 0.782606 0.795178 0.776756	162 172 173 164 186 164 177 170 184 170 175 171	154 153 137 161 151 168 173 165 145 167 158 165 164	0.476621 0.466284 0.467572 0.486527 0.500743 0.463687 0.488827 0.479256 0.51372 0.478448 0.482759 0.525698	0.465517 0.484507 0.497126 0.460674 0.516667 0.451791 0.487603 0.469613 0.511111 0.494186 0.498575 0.46978 0.548023	0.488889 0.4473684 0.4349206 0.5160256 0.4824281 0.4759207 0.490085 0.4896142 0.4632588 0.5352564 0.457971 0.496988 0.5015291
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JOB19-BPN09-D08_T22_H7_J41_0001-00018 JOB19-BPN09-D08_T22_H7_J41_0001-00018 JOB19-BPN09-D08_T22_H7_J41_0001-00019 JOB19-BPN09-D08_T22_H7_J41_0001-00021 JOB19-BPN09-D08_T22_H7_J41_0001-00022 JOB19-BPN09-D08_T22_H7_J41_0001-00024 JOB19-BPN09-D08_T22_H7_J41_0001-00024 JOB19-BPN09-D08_T22_H7_J41_0001-00024 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00031 JOB19-BPN09-D08_T22_H7_J41_0001-00031 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00036 JOB19-BPN09-D08_T22_H7_J41_0001-00040 JOB19-BPN09-D08_T22_H7_J41_0001-00041 JOB19-BPN09-D08_T22_H7_J41_0001-00041 JOB19-BPN09-D08_T22_H7_J41_0001-00041 JOB19-BPN09-D08_T22_H7_J41_0001-00041 JOB19-BPN09-D08_T22_H7_J41_0001-00044	Train	348 355 348 360 363 363 362 364 351 364 357 367 367 357 362 333 362 337 362 337 362 337 362 337 362 337 362 337 362 337 362 344 357 362 372 372 372 372 342 344 344 347 347 347 347 347 347	315 342 315 312 313 353 353 353 337 312 327 324 337 324 337 324 337 324 337 326 339 339 327 326 331 331 331 332 332 332 332 332	272 278 272 284 284 286 280 280 280 282 282 282 282 283 277 277 276 289 299 299 299 299 279 279 279 279 279 27	248	0.784313 0.781921 0.784313 0.790480 0.790480 0.775139 0.776823 0.790825 0.772987 0.775861 0.77292 0.793456 0.78636 0.786549 0.79124 0.779327 0.778623 0.786549 0.779124 0.779267 0.778623 0.786367 0.786367 0.786369 0.786386	0.781607 0.783096 0.781607 0.772776 0.772776 0.782367 0.782481 0.76331 0.75824 0.76331 0.75824 0.76351 0.76565 0.775908 0.76942 0.77036 0.76942 0.77036 0.76942 0.77036 0.76942 0.77036 0.769498 0.76998 0.749998 0.749998 0.78608 0.78306	0.787299 0.787299 0.780299 0.787299 0.805109 0.767703 0.767703 0.767703 0.805109 0.805109 0.805109 0.805090 0.782606 0.795178 0.795163 0.79938 0.79938 0.798163 0.79938 0.798283 0.798284 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283	162 172 173 164 186 164 177 170 173 171 194 170 182 199 170 172 164 173 190 172 174 175 177 170 172 173 174 175 177 170 170 170 170 170 170 170 170 170	154 153 137 161 161 163 165 165 165 164 166 166 166 144 188 155 169 190 197 183 179 156 175 175 175 175 175 175 175 175 175 175	0.476621 0.466284 0.467572 0.467572 0.500743 0.463687 0.479256 0.51372 0.478448 0.482759 0.525698 0.492699 0.513196 0.473837 0.508772 0.50073 0.493689 0.479532 0.511078 0.494673 0.494673 0.494673 0.5040788 0.491803 0.476776 0.509924 0.50719 0.497835 0.510779	0.465517 0.484507 0.497126 0.497126 0.450791 0.487803 0.469613 0.511111 0.494186 0.498575 0.46978 0.501401 0.497297 0.463215 0.509804 0.551247 0.481252 0.455556 0.484594 0.52462 0.455556 0.484594 0.52462 0.455556 0.456889 0.526889 0.528682 0.455551	0.4888889 0.4479684 0.4349206 0.5160256 0.4824281 0.4759207 0.490085 0.4896142 0.4632586 0.457971 0.496988 0.5015291 0.4830769 0.5320513 0.48459813 0.5976453 0.495549 0.537037 0.5325779 0.4740061 0.5014837 0.4958222 0.5083333 0.4972222 0.5083333 0.4972222 0.4886026 0.5162242 0.4886640
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JOB19-BPN09-D08_T22_H7_J41_0001-00018 JOB19-BPN09-D08_T22_H7_J41_0001-00018 JOB19-BPN09-D08_T22_H7_J41_0001-00019 JOB19-BPN09-D08_T22_H7_J41_0001-00021 JOB19-BPN09-D08_T22_H7_J41_0001-00022 JOB19-BPN09-D08_T22_H7_J41_0001-00024 JOB19-BPN09-D08_T22_H7_J41_0001-00024 JOB19-BPN09-D08_T22_H7_J41_0001-00024 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00025 JOB19-BPN09-D08_T22_H7_J41_0001-00031 JOB19-BPN09-D08_T22_H7_J41_0001-00031 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00035 JOB19-BPN09-D08_T22_H7_J41_0001-00036 JOB19-BPN09-D08_T22_H7_J41_0001-00040 JOB19-BPN09-D08_T22_H7_J41_0001-00041 JOB19-BPN09-D08_T22_H7_J41_0001-00041 JOB19-BPN09-D08_T22_H7_J41_0001-00041 JOB19-BPN09-D08_T22_H7_J41_0001-00041 JOB19-BPN09-D08_T22_H7_J41_0001-00044	Train	348 355 348 360 363 363 362 364 351 364 357 367 367 357 362 333 362 337 362 337 362 337 362 337 362 337 362 337 362 337 362 344 357 362 372 372 372 372 342 344 344 347 347 347 347 347 347	315 342 315 312 313 353 353 353 337 312 327 324 337 324 337 324 337 324 337 326 339 339 327 326 331 331 331 332 332 332 332 332	272 278 272 284 284 286 280 280 280 282 282 282 282 283 277 277 276 289 299 299 299 299 279 279 279 279 279 27	248 267 248 267 248 262 271 271 267 262 252 253 270 264 264 264 265 267 268 268 268 268 268 268 268 268 268 268 268 269 260	0.784313 0.781921 0.784313 0.7804813 0.790489 0.775139 0.775139 0.775861 0.790287 0.772587 0.772587 0.7725861 0.786336 0.786336 0.786437 0.786437 0.786387 0.786387 0.786387 0.786387 0.786387 0.786387 0.7863889 0.786387 0.786389 0.786389 0.786389 0.786389 0.786389 0.786389 0.786389 0.786389 0.786389 0.786380	0.781607 0.783096 0.781607 0.77247 0.77247 0.77247 0.782367 0.78249 0.78331 0.78331 0.78331 0.78349 0.78349 0.78491 0.77666 0.77666 0.77903 0.77903 0.77903 0.77903 0.77903 0.77903 0.77999 0.749998 0.749998 0.749998 0.749998 0.749998 0.749998 0.749998 0.749998 0.749998 0.749998 0.749998 0.749998 0.749998 0.78608 0.78608	0.787299 0.787299 0.780299 0.787299 0.805109 0.767703 0.767703 0.767703 0.805109 0.805109 0.805109 0.805090 0.782606 0.795178 0.795163 0.79938 0.79938 0.798163 0.79938 0.798283 0.798284 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283 0.798283	162 172 173 164 186 164 177 170 173 171 194 170 182 199 170 172 164 173 190 172 174 175 177 170 172 173 174 175 177 170 170 170 170 170 170 170 170 170	154 153 137 161 161 151 168 173 165 165 166 156 156 156 164 144 167 174 188 169 169 179 183 179 179 179 179 179 179 179 179 179 179	0.476621 0.466284 0.467572 0.467572 0.500743 0.463687 0.479256 0.51372 0.478448 0.482759 0.525698 0.492699 0.513196 0.473837 0.508772 0.50073 0.493689 0.479532 0.511078 0.494673 0.494673 0.494673 0.5040788 0.491803 0.476776 0.509924 0.50719 0.497835 0.510779	0.465517 0.484507 0.48763 0.460634 0.516667 0.451791 0.487603 0.511111 0.494186 0.498575 0.46978 0.548023 0.501401 0.497297 0.463215 0.50120 0.45023 0.45125 0.487252 0.487855 0.487252 0.495495 0.462366 0.478306 0.456939 0.456939 0.521614 0.46632 0.457830 0.45693 0.521614 0.46632 0.521614 0.46632 0.487603	0.488889 0.4479684 0.4349206 0.5160256 0.4824281 0.4759207 0.490085 0.4896142 0.463288 0.5032564 0.457971 0.49688 0.5015291 0.4830769 0.5320513 0.48459813 0.5902613 0.4955497 0.5320779 0.4740061 0.5014837 0.495222 0.5083333 0.4972222 0.5083333 0.4972222 0.4886064 0.5162242 0.488664 0.5162249

TaskID	File Typ	F1	F4	F1Acc1	F4Acc1	Acc1Rate	F1Acc1Ra	F4Acc1Ra	Rand1Acc	Rand4Acc	RandAccR	Rand1Acc	Rand4AccR
JOB19-BPN09-D08_T22_H7_I40_00001-00001	Test	124	120	80	79	0.651637	0.645156	0.658328	67	58	0.512295	0.540323	0.4833333
JOB19-BPN09-D08_T22_H7_I40_00001-00002	Test	118	106	80	71	0.674104	0.67796	0.669805	66	54	0.535714	0.559322	0.509434
JOB19-BPN09-D08_T22_H7_I40_00001-00003	Test	118	106	80	71	0.674104	0.67796	0.669805	46	53	0.441964	0.389831	0.5
JOB19-BPN09-D08_T22_H7_I40_00001-00004	Test	120	113	80	72	0.652358	0.666661	0.637163	68	62	0.55794	0.566667	0.5486726
JOB19-BPN09-D08_T22_H7_I40_00001-00005	Test	124	123	85	73	0.639674	0.685478	0.593491	59	62	0.489879	0.475806	0.504065
JOB19-BPN09-D08_T22_H7_I40_00001-00006	Test	118	106	80	71	0.674104	0.67796	0.669805	57	52	0.486607	0.483051	0.490566
JOB19-BPN09-D08_T22_H7_I40_00001-00007	Test	118	106	80	71	0.674104	0.67796	0.669805	55	44	0.441964	0.466102	0.4150943
JOB19-BPN09-D08_T22_H7_I40_00001-00008	Test	110	118	77	77	0.675436	0.699994	0.652537	57	64	0.530702	0.518182	0.5423729
JOB19-BPN09-D08_T22_H7_I40_00001-00009	Test	120	121	75	76	0.626553	0.624995	0.628094	65	59	0.514523	0.541667	0.4876033
JOB19-BPN09-D08_T22_H7_I40_00001-00010	Test	105	118	74	74	0.663674	0.704755	0.627113	57	63	0.538117	0.542857	0.5338983
JOB19-BPN09-D08_T22_H7_I40_00001-00011	Test	105	118	74	74	0.663674	0.704755	0.627113	53	62	0.515695	0.504762	0.5254237
JOB19-BPN09-D08_T22_H7_I40_00001-00012	Test	130	126	84	85	0.660154	0.646149	0.674598	70	73	0.558594	0.538462	0.5793651
JOB19-BPN09-D08_T22_H7_I40_00001-00013	Test	127	120	81	77	0.639674	0.63779	0.641661	66	50	0.469636	0.519685	0.4166667
JOB19-BPN09-D08_T22_H7_I40_00001-00014	Test	133	113	84	73	0.638209	0.631574	0.646012	80	47	0.51626	0.601504	0.4159292
JOB19-BPN09-D08_T22_H7_I40_00001-00015	Test	107	118	72	73	0.644442	0.672891	0.618639	57	57	0.506667	0.53271	0.4830508
JOB19-BPN09-D08_T22_H7_I40_00001-00016	Test	107	118	72	73	0.644442	0.672891	0.618639	57	61	0.524444	0.53271	0.5169492
JOB19-BPN09-D08_T22_H7_I40_00001-00017	Test	125	115	76		0.629164	0.607995	0.652168	67	54	0.504167	0.536	0.4695652
JOB19-BPN09-D08_T22_H7_I40_00001-00018	Test	122	130	78	85	0.646823	0.639339	0.653841	67	58	0.496032	0.54918	0.4461538
JOB19-BPN09-D08_T22_H7_I40_00001-00019	Test	122	130	78	85	0.646823	0.639339	0.653841	69	69	0.547619	0.565574	0.5307692
JOB19-BPN09-D08_T22_H7_I40_00001-00020	Test	121	133	75	77	0.598423	0.61983	0.578943	68	75	0.562992	0.561983	0.5639098
JOB19-BPN09-D08_T22_H7_I40_00001-00021	Test	121	133	75	77	0.598423	0.61983	0.578943	45	65	0.433071	0.371901	0.4887218
JOB19-BPN09-D08_T22_H7_I40_00001-00022	Test	130	130	85	80		0.653841	0.61538	60	58	0.453846	0.461538	0.4461538
JOB19-BPN09-D08_T22_H7_I40_00001-00023	Test	116	116	78	74	0.65517	0.672408	0.637926	56	62	0.508621	0.482759	0.5344828
JOB19-BPN09-D08_T22_H7_I40_00001-00024	Test	134	102	83	75	0.669489	0.619398	0.735287	67	48	0.487288	0.5	0.4705882
JOB19-BPN09-D08_T22_H7_I40_00001-00025	Test	106	107	75	69	0.676053	0.70754	0.644854	51	47	0.460094	0.481132	0.4392523
JOB19-BPN09-D08_T22_H7_I40_00001-00026	Test	115	122	78		0.658225	0.678255	0.639339	58	61	0.50211	0.504348	0.5
JOB19-BPN09-D08_T22_H7_I40_00001-00027	Test	133	124	80	78	0.614784	0.601499	0.629027	67	67	0.521401	0.503759	0.5403226
JOB19-BPN09-D08_T22_H7_I40_00001-00028	Test	125	115	76	75	0.629164	0.607995	0.652168	64	62	0.525	0.512	0.5391304
JOB19-BPN09-D08_T22_H7_I40_00001-00029	Test	122	118	75	75	0.624997	0.614749	0.635588	59	48	0.445833	0.483607	0.4067797
JOB19-BPN09-D08_T22_H7_I40_00001-00030	Test	126	129	83	84	0.654899	0.658725	0.651158	68	71	0.545098	0.539683	0.5503876
JOB19-BPN09-D08_T22_H7_I40_00001-00031	Test	126	129	83	84	0.654899	0.658725	0.651158	66	67	0.521569	0.52381	0.5193798
JOB19-BPN09-D08_T22_H7_I40_00001-00032	Test	118	131	79	82	0.646584	0.669486	0.625949	60	70	0.522088	0.508475	0.5343511
JOB19-BPN09-D08_T22_H7_I40_00001-00033	Test	129	112	81	71	0.630703	0.627902	0.633923	60	54	0.473029	0.465116	0.4821429
		S	9				N.	E					

							B.795	1,100					
TaskID	File Typ	F1	F4	F1Acc1	F4Acc1	Acc1Rate	F1Acc1Ra	F4Acc1Ra	Rand1Acc	Rand4Acc	RandAccR	Rand1Acc	Rand4AccR
JOB19-BPN09-D08_T22_H7_I40_00001-00034	Test	110	122	77	78	0.668101	0.699994	0.639339	60	58	0.508621	0.545455	0.4754098
JOB19-BPN09-D08_T22_H7_I40_00001-00035	Test	123	130	82	84	0.656124	0.666661	0.646149	68	66	0.529644	0.552846	0.5076923
JOB19-BPN09-D08_T22_H7_I40_00001-00036	Test	111	119	80	80	0.695649	0.720714	0.672263	58	60	0.513043	0.522523	0.5042017
JOB19-BPN09-D08_T22_H7_I40_00001-00037	Test	125	113	80	71	0.634451	0.639995	0.628313	66	55	0.508403	0.528	0.4867257
JOB19-BPN09-D08_T22_H7_I40_00001-00038	Test	111	119	80	80	0.695649	0.720714	0.672263	58	55	0.491304	0.522523	0.4621849
JOB19-BPN09-D08_T22_H7_I40_00001-00039	Test	113	122	76	77	0.651061	0.67256	0.631142	62	64	0.53617	0.548673	0.5245902
JOB19-BPN09-D08_T22_H7_I40_00001-00040	Test	125	113	80	71	0.634451	0.639995	0.628313	80	56	0.571429	0.64	0.4955752
JOB19-BPN09-D08_T22_H7_I40_00001-00041	Test	115	114	78	77	0.676853	0.678255	0.675433	54	63	0.510917	0.469565	0.5526316
JOB19-BPN09-D08_T22_H7_I40_00001-00042	Test	98	114	69	72	0.665091	0.704074	0.631573	50	65	0.542453	0.510204	0.5701754
JOB19-BPN09-D08_T22_H7_I40_00001-00043	Test	125	120	77	77	0.628569	0.615995	0.641661	53	55	0.440816	0.424	0.4583333
JOB19-BPN09-D08_T22_H7_I40_00001-00044	Test	125	120	77	77	0.628569	0.615995	0.641661	61	66	0.518367	0.488	0.55
JOB19-BPN09-D08_T22_H7_I40_00001-00045	Test	128	115	80	74	0.633742	0.624995	0.643473	58	63	0.497942	0.453125	0.5478261
JOB19-BPN09-D08_T22_H7_I40_00001-00046	Test	128	115	80	74	0.633742	0.624995	0.643473	75	53	0.526749	0.585938	0.4608696
JOB19-BPN09-D08_T22_H7_I40_00001-00047	Test	119	117	77	75	0.644065	0.647053	0.64102	63	56	0.504237	0.529412	0.4786325
JOB19-BPN09-D08_T22_H7_I40_00001-00048	Test	120	121	80	76	0.6473	0.666661	0.628094	71	59	0.539419	0.591667	0.4876033
JOB19-BPN09-D08_T22_H7_I40_00001-00049	Test	115	120	77	79	0.663827	0.669559	0.658328	53	65	0.502128	0.46087	0.5416667
JOB19-BPN09-D08_T22_H7_I40_00001-00050	Test	115	120	77	79	0.663827	0.669559	0.658328	48	61	0.46383	0.417391	0.5083333
JOB19-BPN09-D08_T22_H7_I41_00001-00001	Test	128	128	79	82	0.628904	0.617183	0.64062	61	64	0.488281	0.476563	0.5
JOB19-BPN09-D08_T22_H7_I41_00001-00002	Test	128	128	79	82	0.628904	0.617183	0.64062	55	67	0.476563	0.429688	0.5234375
JOB19-BPN09-D08_T22_H7_I41_00001-00003	Test	125	125	84	82	0.663997	0.671995	0.655995	65	61	0.504	0.52	0.488
JOB19-BPN09-D08_T22_H7_I41_00001-00004	Test	120	116	76	74	0.635591	0.633328	0.637926	64	54	0.5	0.533333	0.4655172
JOB19-BPN09-D08_T22_H7_I41_00001-00005	Test	109	119	76	75	0.662278	0.697241	0.630247	51	51	0.447368	0.46789	0.4285714
JOB19-BPN09-D08_T22_H7_I41_00001-00006	Test	122	129	78	80	0.62948	0.639339	0.62015	64	56	0.478088	0.52459	0.4341085
JOB19-BPN09-D08_T22_H7_I41_00001-00007	Test	124	120	85	79	0.672128	0.685478	0.658328	63	58	0.495902	0.508065	0.4833333
JOB19-BPN09-D08_T22_H7_I41_00001-00008	Test	111	117	75	74	0.653506	0.67567	0.632473	56	54	0.482456	0.504505	0.4615385
JOB19-BPN09-D08_T22_H7_I41_00001-00009	Test	120	116	76	74	0.635591	0.633328	0.637926	52	64	0.491525	0.433333	0.5517241
JOB19-BPN09-D08_T22_H7_I41_00001-00010	Test	121	122	76	78	0.633742	0.628094	0.639339	52	60	0.460905	0.429752	0.4918033
JOB19-BPN09-D08_T22_H7_I41_00001-00011	Test	100	114	70	72	0.663548	0.699993	0.631573	56	57	0.528037	0.56	0.5
JOB19-BPN09-D08_T22_H7_I41_00001-00012	Test	133	111	75	72	0.602457	0.563906	0.648643	65	59	0.508197	0.488722	0.5315315
JOB19-BPN09-D08_T22_H7_I41_00001-00013	Test	121	111	77	73	0.646549	0.636358	0.657652	61	59	0.517241	0.504132	0.5315315
JOB19-BPN09-D08_T22_H7_I41_00001-00014	Test	137	110	85	67	0.615382	0.620433	0.609085	63	62	0.506073	0.459854	0.5636364
JOB19-BPN09-D08_T22_H7_I41_00001-00015	Test	143	123	83	74	0.590223	0.580416	0.601621	80	65	0.545113	0.559441	0.5284553
JOB19-BPN09-D08_T22_H7_J41_00001-00016	Test	93	114	68	77	0.70048	0.731175	0.675433	51	47	0.47343	0.548387	0.4122807

TaskID	File Typ	F1	F4	F1Acc1	F4Acc1	Acc1Rate	F1Acc1Ra	F4Acc1Ra	Rand1Acc	Rand4Acc	RandAccR	Rand1Acc	Rand4AccR
JOB19-BPN09-D08_T22_H7_J41_00001-00017	Test	93	114	68	77	0.70048	0.731175	0.675433	49	56	0.507246	0.526882	0.4912281
JOB19-BPN09-D08_T22_H7_I41_00001-00018	Test	122	117	75	74	0.623428	0.614749	0.632473	64	58	0.51046	0.52459	0.4957265
JOB19-BPN09-D08_T22_H7_I41_00001-00019	Test	93	114	68	77	0.70048	0.731175	0.675433	45	54	0.478261	0.483871	0.4736842
JOB19-BPN09-D08_T22_H7_I41_00001-00020	Test	121	111	77	73	0.646549	0.636358	0.657652	68	52	0.517241	0.561983	0.4684685
JOB19-BPN09-D08_T22_H7_I41_00001-00021	Test	124	114	78	78	0.655459	0.629027	0.684205	68	58	0.529412	0.548387	0.5087719
JOB19-BPN09-D08_T22_H7_I41_00001-00022	Test	124	136	78	85	0.626921	0.629027	0.624995	64	57	0.465385	0.516129	0.4191176
JOB19-BPN09-D08_T22_H7_I41_00001-00023	Test	124	136	78	85	0.626921	0.629027	0.624995	55	70	0.480769	0.443548	0.5147059
JOB19-BPN09-D08_T22_H7_I41_00001-00024	Test	129	121	80	79	0.635997	0.62015	0.652887	64	65	0.516	0.496124	0.5371901
JOB19-BPN09-D08_T22_H7_I41_00001-00025	Test	124	114	78	78	0.655459	0.629027	0.684205	68	47	0.483193	0.548387	0.4122807
JOB19-BPN09-D08_T22_H7_I41_00001-00026	Test	105	113	68	77	0.665135	0.647613	0.68141	50	54	0.477064	0.47619	0.4778761
JOB19-BPN09-D08_T22_H7_I41_00001-00027	Test	106	125	75	80	0.670993	0.70754	0.639995	48	62	0.47619	0.45283	0.496
JOB19-BPN09-D08_T22_H7_I41_00001-00028	Test	119	128	72	80	0.615382	0.605037	0.624995	67	58	0.506073	0.563025	0.453125
JOB19-BPN09-D08_T22_H7_I41_00001-00029	Test	122	129	78	80	0.62948	0.639339	0.62015	66	64	0.517928	0.540984	0.496124
JOB19-BPN09-D08_T22_H7_I41_00001-00030	Test	121	120	74	73	0.609956	0.611565	0.608328	59	58	0.485477	0.487603	0.4833333
JOB19-BPN09-D08_T22_H7_I41_00001-00031	Test	124	120	82	74	0.639342	0.661285	0.616662	67	60	0.520492	0.540323	0.5
JOB19-BPN09-D08_T22_H7_I41_00001-00032	Test	122	141	69	83	0.577945	0.565569	0.588648	45	72	0.444867	0.368852	0.5106383
JOB19-BPN09-D08_T22_H7_I41_00001-00033	Test	117	123	77	78	0.645831	0.658114	0.634141	63	54	0.4875	0.538462	0.4390244
JOB19-BPN09-D08_T22_H7_I41_00001-00034	Test	128	121	81	79	0.642568	0.632808	0.652887	62	65	0.51004	0.484375	0.5371901
JOB19-BPN09-D08_T22_H7_I41_00001-00035	Test	120	130	72	80	0.607998	0.599995	0.61538	51	62	0.452	0.425	0.4769231
JOB19-BPN09-D08_T22_H7_I41_00001-00036	Test	106	117	75	74	0.668158	0.70754	0.632473	61	65	0.565022	0.575472	0.5555556
JOB19-BPN09-D08_T22_H7_I41_00001-00037	Test	117	127	77	81	0.647538	0.658114	0.63779	42	62	0.42623	0.358974	0.488189
JOB19-BPN09-D08_T22_H7_I41_00001-00038	Test	117	123	77	78	0.645831	0.658114	0.634141	51	56	0.445833	0.435897	0.4552846
JOB19-BPN09-D08_T22_H7_I41_00001-00039	Test	129	121	80	79	0.635997	0.62015	0.652887	62	69	0.524	0.48062	0.5702479
JOB19-BPN09-D08_T22_H7_I41_00001-00040	Test	115	114	78	77	0.676853	0.678255	0.675433	51	57	0.471616	0.443478	0.5
JOB19-BPN09-D08_T22_H7_I41_00001-00041	Test	118	131	79	82	0.646584	0.669486	0.625949	54	67	0.485944	0.457627	0.5114504
JOB19-BPN09-D08_T22_H7_I41_00001-00042	Test	118	131	79	82	0.646584	0.669486	0.625949	63	63	0.506024	0.533898	0.480916
JOB19-BPN09-D08_T22_H7_I41_00001-00043	Test	118	131	79	82	0.646584	0.669486	0.625949	62	71	0.534137	0.525424	0.5419847
JOB19-BPN09-D08_T22_H7_I41_00001-00044	Test	105	112	73	75	0.682025	0.695231	0.669637	47	64	0.511521	0.447619	0.5714286
JOB19-BPN09-D08_T22_H7_I41_00001-00045	Test	121	121	80	75	0.640493	0.661152	0.61983	53	59	0.46281	0.438017	0.4876033
JOB19-BPN09-D08_T22_H7_I41_00001-00046	Test	108	137	70	81	0.616324	0.648142	0.591237	65	71	0.555102	0.601852	0.5182482
JOB19-BPN09-D08_T22_H7_I41_00001-00047	Test	113	114	76	74	0.66079	0.67256	0.649117	49	55	0.45815	0.433628	0.4824561
JOB19-BPN09-D08_T22_H7_J41_00001-00048	Test	127	113	76	71	0.612497	0.59842	0.628313	60	53	0.470833	0.472441	0.4690265
JOB19-BPN09-D08_T22_H7_J41_00001-00049	Test	127	113	76	71	0.612497	0.59842	0.628313	65	54	0.495833	0.511811	0.4778761
JOB19-BPN09-D08_T22_H7_J41_00001-00050	Test	127	113	76	71	0.612497	0.59842	0.628313	78	59	0.570833	0.614173	0.5221239



A.2. 本研究實驗組和對照組投資績效

本附錄為實驗100次的投資績效,損益單位為期貨點數,交易手續費用和交易稅 己扣除,每趙來回交易扣除5點期貨點數。欄位PMDF1為實驗組預測大跌的損益績 效,欄位PMDF4為實驗組預測大漲的損益績效,欄位PMDA11為實驗組預測大漲或 大跌的損益績效;RandPMDF1,RandPMDF4,RandPMDA11以隨機漫步的對照組損益 績效。

TaskID	File Tyr	PMDAIL	獲利率	PMDF1	PMDF4	RandPMDAll	Rand淮利率	RandPMDF1	RandPMDF4
JOB19-BPN09-D08_T22_H7_I40_00001-00001	Test	35790.78	0.264295	18889.23	16901.55		0.041688778	3768.5487	1876.9456
JOB19-BPN09-D08_T22_H7_I40_00001-00002	Test	36682.53	0.295065	20420.46	16262.07		0.042928753	2668.7817	2668.1209
JOB19-BPN09-D08_T22_H7_I40_00001-00003	Test	36682.53	0.295065	20420.46	16262.07		0.042928753	2668.7817	2668.1209
JOB19-BPN09-D08_T22_H7_J40_00001-00004	Test	37447.41	0.289583	20056.52	17390.9	7455.2148	0.057651586	2944.0773	4511.1375
JOB19-BPN09-D08_T22_H7_I40_00001-00005	Test	36171.36	0.263861	21888.67	14282.69	6657.3434	0.048563617	5262.2254	1395.118
JOB19-BPN09-D08_T22_H7_I40_00001-00006	Test	36682.53	0.295065	20420.46	16262.07	5336,9026	0.042928753	2668.7817	2668.1209
JOB19-BPN09-D08_T22_H7_I40_00001-00007	Test	36682.53	0.295065	20420.46	16262.07	5336.9026	0.042928753	2668.7817	2668.1209
JOB19-BPN09-D08_T22_H7_I40_00001-00008	Test	36370.91	0.287426	20441.44	15929.47	4448.5377	0.08515519	3812.9572	635.5805
JOB19-BPN09-D08_T22_H7_J40_00001-00009	Test	33913.24	0.253547	18327.2	15586.04		0.028905642	5223.5893	-1357.3151
JOB19-BPN09-D08_T22_H7_I40_00001-00010	Test	35681.4	0.2883	19742.99	15938.41		0.053940039	6847.196	-171.3071
JOB19-BPN09-D08_T22_H7_I40_00001-00011	Test	35681.4	0.2883	19742.99	15938.41		0.053940039	6847.196	-171.3071
JOB19-BPN09-D08_T22_H7_I40_00001-00012	Test	40933.73	0.288103	20595.63	20338.1		0.046876976	1311.9052	5348.3756
JOB19-BPN09-D08_T22_H7_I40_00001-00013	Test	35639.62	0.259982	19282.12	16357.51		0.035572757	4991.8149	-115.3235
JOB19-BPN09-D08_T22_H7_J40_00001-00014	Test	35833.36	0.262458	20498.14	15335.21		0.030285458	1183.5776	2951.296
JOB19-BPN09-D08_T22_H7_I40_00001-00015	Test	34906.19	0.279529	18334.35	16571.84		0.041240581	2698.932 2698.932	2450.9856
JOB19-BPN09-D08_T22_H7_I40_00001-00016 JOB19-BPN09-D08_T22_H7_I40_00001-00017	Test Test	34906.19 33769.2	0.279529 0.253523	18334.35 18297.1	16571.84 15472.1		0.041240581 0.020959785	1511.9045	2450.9856 1279.9389
JOB19-BPN09-D08_T22_H7_I40_00001-00018	Test	40239.33	0.287711	19164.69	21074.64		0.020939783	2697,4599	3077.4777
JOB19-BPN09-D08_T22_H7_J40_00001-00019	Test	40239.33	0.287711	19164.69	21074.64		0.041290845	2697,4599	3077.4777
JOB19-BPN09-D08_T22_H7_J40_00001-00020	Test	33730.95	0.239278	17927.42	15808.53		0.033557469	3946.7627	783.8337
JOB19-BPN09-D08_T22_H7_J40_00001-00021	Test	33730.95	0.239278	17927.42	15803.53		0.033557469	3946.7627	783.8337
JOB19-BPN09-D08_T22_H7_J40_00001-00022	Test	40117.91	0.278017	21187.63	18930.28		0.031928671	1920.3341	2686.9731
JOB19-BPN09-D08_T22_H7_I40_00001-00023	Test	35402.16	0.274947	19718.03	15684.13		0.030640961	5429.7299	-1484.3998
JOB19-BPN09-D08_T22_H7_I40_00001-00024	Test	37059.53	0.28294	19837	17222.53		0.047479106	1457.501	4761.3123
JOB19-BPN09-D08_T22_H7_I40_00001-00025	Test	34637.41	0.293004	20071	14566.41		0.080906952	6587.1183	2977.297
JOB19-BPN09-D08_T22_H7_I40_00001-00026	Test	36244.22	0.275548	19892.61	16351.61	3322.6888	0.025260872	1880.6234	1442.0654
JOB19-BPN09-D08_T22_H7_I40_00001-00027	Test	35937.32	0.251953	18699.55	17237.77	5286.3124	0.037061818	808.5302	4477.7822
JOB19-BPN09-D08_T22_H7_I40_00001-00028	Test	33769.2	0.253523	18297.1	15472.1	2791.8434	0.020959785	1511.9045	1279.9389
JOB19-BPN09-D08_T22_H7_I40_00001-00029	Test	32998.11	0.247734	17642.31	15355.8	3007.1301	0.022576052	2110.312	896.8181
JOB19-BPN09-D08_T22_H7_I40_00001-00030	Test	40503.93	0.286196	20718.21	19785.72	6891.3997	0.048693868	3622.138	3269.2617
JOB19-BPN09-D08_T22_H7_J40_00001-00031	Test	40503.93	0.286196	20718.21	19785.72	6891.3997	0.048693868	3622.138	3269.2617
JOB19-BPN09-D08_T22_H7_J40_00001-00032	Test	36682.38	0.265439	20209.78	16472.59		0.036970843	3801.0356	1308.1501
JOB19-BPN09-D08_T22_H7_I40_00001-00033	Test	35578.25	0.265996	19704.86	15873.39	4911.0142	0.036716491	2951.3359	1959.6783
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TaskID	File Typ	PMDAIL	- 1004-4	B-01	PMDF4	RandPMDAll	Rand獲利率	RandPMDF1	RandPMDF4
TaskID JOB19-BPN09-D08_T22_H7_J40_00001-00034	100	PMDAll 36768.67	- 1004-4	B-01	PMDF4 16146.96		Rand獲利率 0.067165214		RandPMDF4 1033.3828
JOB19-BPN09-D08_T22_H7_J40_00001-00034 JOB19-BPN09-D08_T22_H7_J40_00001-00085	File Typ		獲利率	PMDF1					
JOB19-BPN09-D08_T22_H7_J40_00001-00034	File Typ Test	36768.67	獲利率 0.28556	PMDF1 20621.72	16146.96	8648.193	0.067165214	7614.8102	1033.3828
JOB19-BPN09-D08_T22_H7_I40_00001-00034 JOB19-BPN09-D08_T22_H7_I40_00001-00035 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00037	File Typ Test Test Test Test	36768.67 40637.42 39623.77 36490.01	獲利率 0.28556 0.289409 0.310409 0.276251	PMDF1 20621.72 20573.37 21898.99 20071.49	16146.96 20064.05 17724.78 16418.52	8648.193 6315.6693 8638.2446 4043.952	0.067165214 0.044978594 0.067671325 0.030615126	7614.8102 2739.8021 6291.7553 3787.9168	1033.3828 3575.8672 2346.4893 256.0352
JOB19-BPN09-D08_T22_H7_I40_00001-00034 JOB19-BPN09-D08_T22_H7_I40_00001-00035 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00037 JOB19-BPN09-D08_T22_H7_I40_00001-00038	File Typ Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77	獲利率 0.28556 0.289409 0.310409 0.276251 0.310409	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99	16146.96 20064.05 17724.78 16418.52 17724.78	8648.193 6315.6693 8638.2446 4043.952 8638.2446	0.067165214 0.044978594 0.067671325 0.030615126 0.067671325	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553	1033.3828 3575.8672 2346.4893 256.0352 2346.4893
JOB19-BPN09-D08_T22_H7_I40_00001-00034 JOB19-BPN09-D08_T22_H7_I40_00001-00035 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00038 JOB19-BPN09-D08_T22_H7_I40_00001-00038 JOB19-BPN09-D08_T22_H7_I40_00001-00039	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36437.37	獲利率 0.28556 0.289409 0.310409 0.276251 0.310409 0.279374	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89	16146.96 20064.05 17724.78 16418.52 17724.78 17062.49	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443	0.067165214 0.044978594 0.067671325 0.030615126 0.067671325 0.03670956	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175
JOB19-BPN09-D08_T22_H7_J40_00001-00034 JOB19-BPN09-D08_T22_H7_J40_00001-00036 JOB19-BPN09-D08_T22_H7_J40_00001-00037 JOB19-BPN09-D08_T22_H7_J40_00001-00038 JOB19-BPN09-D08_T22_H7_J40_00001-00039 JOB19-BPN09-D08_T22_H7_J40_00001-00039 JOB19-BPN09-D08_T22_H7_J40_00001-00040	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36437.37 36490.01	獲利率 0.28556 0.285409 0.310409 0.276251 0.310409 0.279374 0.276251	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49	16146.96 20064.05 17724.78 16418.52 17724.78 17062.49 16418.52	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952	0.067165214 0.044978594 0.067671325 0.030615126 0.067671325 0.03670956 0.030615126	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268 3787.9168	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352
JOB19-BPN09-D08_T22_H7_J40_00001-00034 JOB19-BPN09-D08_T22_H7_J40_00001-00036 JOB19-BPN09-D08_T22_H7_J40_00001-00037 JOB19-BPN09-D08_T22_H7_J40_00001-00038 JOB19-BPN09-D08_T22_H7_J40_00001-00039 JOB19-BPN09-D08_T22_H7_J40_00001-00040 JOB19-BPN09-D08_T22_H7_J40_00001-00040	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36437.37 36490.01 37162.44	獲利率 0.28556 0.285409 0.310409 0.276251 0.310409 0.279374 0.276251 0.292399	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68	16146.96 20064.05 17724.78 16418.52 17724.78 17062.49 16418.52 16647.76	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 4878.8891	0.067165214 0.044978594 0.067671325 0.030615126 0.067671325 0.03670956 0.030615126 0.038387734	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268 3787.9168 2478.6902	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989
JOB19-BPN09-D08_T22_H7_J40_00001-00034 JOB19-BPN09-D08_T22_H7_J40_00001-00036 JOB19-BPN09-D08_T22_H7_J40_00001-00037 JOB19-BPN09-D08_T22_H7_J40_00001-00038 JOB19-BPN09-D08_T22_H7_J40_00001-00039 JOB19-BPN09-D08_T22_H7_J40_00001-00040 JOB19-BPN09-D08_T22_H7_J40_00001-00041 JOB19-BPN09-D08_T22_H7_J40_00001-00042	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36437.37 36490.01 37162.44 35660.7	獲利率0.285560.2894090.3104090.2762510.3104090.2793740.2762510.2923990.303083	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84	16146.96 20064.05 17724.78 16418.52 17724.78 17062.49 16418.52 16647.76 17098.86	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 4878.8891 7804.5458	0.067165214 0.044978594 0.067671325 0.030615126 0.067671325 0.03670956 0.030615126 0.038387734 0.066331343	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268 3787.9168 2478.6902 4647.6729	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729
JOB19-BPN09-D08_T22_H7_I40_00001-00034 JOB19-BPN09-D08_T22_H7_I40_00001-00035 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00037 JOB19-BPN09-D08_T22_H7_I40_00001-00038 JOB19-BPN09-D08_T22_H7_I40_00001-00040 JOB19-BPN09-D08_T22_H7_I40_00001-00041 JOB19-BPN09-D08_T22_H7_I40_00001-00042 JOB19-BPN09-D08_T22_H7_I40_00001-00042 JOB19-BPN09-D08_T22_H7_I40_00001-00043	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36437.37 36490.01 37162.44 35660.7 36117.32	獲利率0.285560.2894090.3104090.2762510.3104090.2793740.2762510.2923990.3030830.265617	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84 17843.19	16146.96 20064.05 17724.78 16418.52 17724.78 17062.49 16418.52 16647.76 17098.86 18274.12	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 4878.8891 7804.5458 6354.0536	0.067165214 0.044978594 0.067671325 0.030615126 0.067671325 0.03670956 0.030615126 0.038387734 0.066331343 0.046729572	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268 3787.9168 2478.6902 4647.6729 3494.449	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729 2859.6046
JOB19-BPN09-D08_T22_H7_I40_00001-00034 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00037 JOB19-BPN09-D08_T22_H7_I40_00001-00038 JOB19-BPN09-D08_T22_H7_I40_00001-00049 JOB19-BPN09-D08_T22_H7_I40_00001-00041 JOB19-BPN09-D08_T22_H7_I40_00001-00042 JOB19-BPN09-D08_T22_H7_I40_00001-00042 JOB19-BPN09-D08_T22_H7_I40_00001-00043 JOB19-BPN09-D08_T22_H7_I40_00001-00044	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36437.37 36490.01 37162.44 35660.7 36117.32 36117.32	獲利率0.285560.2894090.3104090.2762510.3104090.2793740.2762510.2923990.3030830.2656170.265617	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84 17843.19 17843.19	16146.96 20064.05 17724.78 16418.52 17724.78 17062.49 16418.52 16647.76 17098.86 18274.12 18274.12	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 4878.8891 7804.5458 6354.0536	0.067165214 0.044978594 0.067671325 0.030615126 0.067671325 0.036670956 0.030615126 0.038387734 0.066331343 0.046729572	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268 3787.9168 2478.6902 4647.6729 3494.449	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729 2859.6046
JOB19-BPN09-D08_T22_H7_I40_00001-00034 JOB19-BPN09-D08_T22_H7_I40_00001-00035 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00037 JOB19-BPN09-D08_T22_H7_I40_00001-00039 JOB19-BPN09-D08_T22_H7_I40_00001-00040 JOB19-BPN09-D08_T22_H7_I40_00001-00041 JOB19-BPN09-D08_T22_H7_I40_00001-00042 JOB19-BPN09-D08_T22_H7_I40_00001-00043 JOB19-BPN09-D08_T22_H7_I40_00001-00044 JOB19-BPN09-D08_T22_H7_I40_00001-00044 JOB19-BPN09-D08_T22_H7_I40_00001-00044	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36437.37 36490.01 37162.44 35660.7 36117.32 36117.32 35048.16	連利率0.285560.2894090.3104090.2762510.3104090.2793740.27924510.2922990.3030830.2656170.259876	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84 17843.19 17843.19	16146.96 20064.05 17724.78 16418.52 17724.78 17062.49 16418.52 16647.76 17098.86 18274.12 18274.12	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 7804.5458 6354.0536 6354.0536 1170.9728	0.067165214 0.044978594 0.067671325 0.030615126 0.067671325 0.030615126 0.030615126 0.038387734 0.066331343 0.046729572 0.046729572	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268 3787.9168 2478.6902 4647.6729 3494.449 393.7186	1083.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729 2859.6046 777.2542
JOB19-BPN09-D08_T22_H7_I40_00001-00034 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00037 JOB19-BPN09-D08_T22_H7_I40_00001-00039 JOB19-BPN09-D08_T22_H7_I40_00001-00040 JOB19-BPN09-D08_T22_H7_I40_00001-00041 JOB19-BPN09-D08_T22_H7_I40_00001-00042 JOB19-BPN09-D08_T22_H7_I40_00001-00043 JOB19-BPN09-D08_T22_H7_I40_00001-00044 JOB19-BPN09-D08_T22_H7_I40_00001-00044 JOB19-BPN09-D08_T22_H7_I40_00001-00044 JOB19-BPN09-D08_T22_H7_I40_00001-00044	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36437.37 36490.01 37162.44 35660.7 36117.32 36117.32 35048.16	連利率0.285560.2894090.3104090.2762510.3104090.2793740.2762510.2962510.2962510.2962510.2962610.2656170.2658760.259876	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84 17843.19 17843.19 18998.55 18998.55	16146.96 20064.05 17724.78 16418.52 17724.78 17062.49 16418.52 16647.76 17098.86 18274.12 16109.62 16109.62	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 4878.8891 7804.5458 6354.0536 6354.0536 1170.9728 1170.9728	0.067165214 0.044978594 0.067671325 0.030615126 0.067671325 0.030615126 0.030615126 0.0308387734 0.066331343 0.046729572 0.046729572 0.008682555	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268 3787.9168 2478.6902 4647.6729 3494.449 393.7186 393.7186	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729 2859.6046 2859.6046 777.2542
JOB19-BPN09-D08_T22_H7_I40_00001-00034 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00038 JOB19-BPN09-D08_T22_H7_I40_00001-00039 JOB19-BPN09-D08_T22_H7_I40_00001-00040 JOB19-BPN09-D08_T22_H7_I40_00001-00041 JOB19-BPN09-D08_T22_H7_I40_00001-00042 JOB19-BPN09-D08_T22_H7_I40_00001-00043 JOB19-BPN09-D08_T22_H7_I40_00001-00044 JOB19-BPN09-D08_T22_H7_I40_00001-00044 JOB19-BPN09-D08_T22_H7_I40_00001-00044 JOB19-BPN09-D08_T22_H7_I40_00001-00044 JOB19-BPN09-D08_T22_H7_I40_00001-00046 JOB19-BPN09-D08_T22_H7_I40_00001-00046	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36490.01 37162.44 35660.72 36117.32 35048.16 35048.16	連利率0.285560.2894090.3104090.2762510.3104090.2792740.2762510.2923990.308380.3656170.2598760.2598760.2598760.2598779	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84 17843.19 17843.19 18998.55 18998.55	16146.96 20064.05 17724.78 16418.52 17704.78 17062.49 16418.52 16647.76 17098.86 18274.12 16109.62 16109.62	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 4878.8891 7804.5458 6354.0536 6354.0536 1170.9728 1170.9728 5420.2773	0.067165214 0.044978594 0.067671325 0.030615126 0.03670956 0.036370956 0.038387734 0.066331343 0.046729572 0.008682555 0.0041382481	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268 3787.9168 2478.6902 3494.449 3494.449 393.7186 393.7186 5294.0223	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729 2859.6046 777.2542 777.2542 126.255
JOB19-BPN09-D08_T22_H7_I40_00001-00034 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00038 JOB19-BPN09-D08_T22_H7_I40_00001-00039 JOB19-BPN09-D08_T22_H7_I40_00001-00040 JOB19-BPN09-D08_T22_H7_I40_00001-00041 JOB19-BPN09-D08_T22_H7_I40_00001-00044	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36437.37 36490.01 37162.44 35607.7 36117.32 35048.16 35048.16 34549.77 35975.3	連利率0.285560.2894090.3104090.2762510.3104090.2793740.2762510.2962510.2962510.2962510.2962610.2656170.2658760.259876	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84 17843.19 17843.19 17843.55 18998.55 19978.35 20004.17	16146.96 20064.05 17724.78 16418.52 17724.78 17062.49 16418.52 16647.76 17098.86 18274.12 16109.62 16109.62 15171.41	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 4878.8891 7804.54536 6354.0536 6354.0536 1170.9728 1170.9728 5420.2773 6062.6424	0.067165214 0.044978594 0.067671325 0.030615126 0.03670956 0.03631343 0.066331343 0.046729572 0.008882555 0.008682555 0.041382481 0.045326473	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268 3787.9168 2478.6902 4647.6729 3494.449 393.7186 393.7186 5294.0223 3768.8967	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729 2559.6046 777.2542 777.2542 126.255 2293.7457
JOB19-BPN09-D08_T22_H7_I40_00001-00034 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00036 JOB19-BPN09-D08_T22_H7_I40_00001-00038 JOB19-BPN09-D08_T22_H7_I40_00001-00039 JOB19-BPN09-D08_T22_H7_I40_00001-00040 JOB19-BPN09-D08_T22_H7_I40_00001-00041 JOB19-BPN09-D08_T22_H7_I40_00001-00042 JOB19-BPN09-D08_T22_H7_I40_00001-00043 JOB19-BPN09-D08_T22_H7_I40_00001-00044	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36437.37 36490.01 37162.44 35660.7 36117.32 35048.16 35048.16 34549.77 35975.3	 應利率 0.28556 0.289409 0.310409 0.276251 0.310409 0.279374 0.276251 0.292399 0.3083 0.265617 0.259876 0.259876 0.263779 0.268964 	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84 17843.19 17843.19 17843.55 18998.55 19978.35 20004.17	16146.96 20064.05 17724.78 16418.52 17724.78 17062.49 16418.52 16647.76 17098.86 18274.12 186109.62 16109.62 15171.41 18971.14	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 4878.8891 7804.5453 6354.0536 6354.0536 1170.9728 5420.2773 6062.6424 6283.7846	0.067165214 0.044978594 0.067671325 0.030615126 0.03670956 0.036370956 0.038387734 0.066331343 0.046729572 0.008682555 0.0041382481	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268 3787.9168 2478.6902 3494.449 3494.449 393.7186 393.7186 5294.0223	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729 2859.6046 777.2542 777.2542 126.255
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JOB19-BPNO9-D08_T22_H7_J40_0001-00034 JOB19-BPNO9-D08_T22_H7_J40_0001-00036 JOB19-BPNO9-D08_T22_H7_J40_0001-00036 JOB19-BPNO9-D08_T22_H7_J40_0001-00037 JOB19-BPNO9-D08_T22_H7_J40_0001-00039 JOB19-BPNO9-D08_T22_H7_J40_0001-00049 JOB19-BPNO9-D08_T22_H7_J40_0001-00041 JOB19-BPNO9-D08_T22_H7_J40_0001-00041 JOB19-BPNO9-D08_T22_H7_J40_0001-00042 JOB19-BPNO9-D08_T22_H7_J40_0001-00043 JOB19-BPNO9-D08_T22_H7_J40_0001-00044 JOB19-BPNO9-D08_T22_H7_J40_0001-00044 JOB19-BPNO9-D08_T22_H7_J40_0001-00045 JOB19-BPNO9-D08_T22_H7_J40_0001-00045 JOB19-BPNO9-D08_T22_H7_J40_0001-00046 JOB19-BPNO9-D08_T22_H7_J40_0001-00046 JOB19-BPNO9-D08_T22_H7_J40_0001-00049 JOB19-BPNO9-D08_T22_H7_J40_0001-00049 JOB19-BPNO9-D08_T22_H7_J40_0001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00003 JOB19-BPNO9-D08_T22_H7_J41_00001-00004 JOB19-BPNO9-D08_T22_H7_J41_00001-00004 JOB19-BPNO9-D08_T22_H7_J41_00001-00004 JOB19-BPNO9-D08_T22_H7_J41_00001-00004 JOB19-BPNO9-D08_T22_H7_J41_00001-00006	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36490.01 37162.44 35660.7 36117.32 35048.16 35048.16 35048.16 35776.27 37706.27 36880.77 38880.78 3887.52 39871.49	 銀利率 0.28556 0.299409 0.310409 0.276251 0.310409 0.279374 0.276251 0.292393 0.365617 0.259676 0.259876 0.259876 0.259876 0.259876 0.259578 0.29193 0.259578 0.277358 0.259578 0.277358 0.259578 0.279358 0.259578 0.259578	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84 17843.19 17843.19 18998.55 18998.55 19378.35 20004.17 19575.23 19184.6 21070.27 18679.37 1918.98 18965.46 22339.58 18965.46 22339.58 18679.37 18164.3 18699.73	16146.96 20064.05 17724.78 16418.52 17724.78 17062.49 16418.52 16647.76 17098.86 18274.12 18199.62 16109.62 15171.41 15971.14 18131.04 17696.18 17413.1 15218.15 15762.94 20406.03 16775.01 17117.95 17396.69 17261.93	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 4787.8491 7804.5458 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6423.7846 6423.7846 6446.9695 3618.6158 2372.1739 5538.9735 4561.7698 8582.0096 8582.0096 8582.0096 8582.0098	0.067165214 0.044978594 0.067671325 0.030615126 0.03670756 0.036615126 0.03631343 0.046729572 0.046729572 0.008682555 0.008682555 0.041382481 0.04537563	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3075.6268 3787.9168 2478.6902 4647.6729 3494.449 393.7186 5294.0223 3768.8967 2864.328 2864.328 2801.9514 2412.2301 3245.7646 2674.7011 2082.4708 6972.3505 2398.6822 2394.6226 2394.6226 2394.6226 2394.6226	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729 2859.6046 777.2542 777.2542 126.255 2293.7457 3419.4566 3845.0181 1206.3857 873.5907 2864.2724 2479.299 1609.6591 3021.2139 873.5907 2250.3827 22915.2076
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JOB19-BPNO9-D08_T22_H7_J40_0001-00034 JOB19-BPNO9-D08_T22_H7_J40_0001-00036 JOB19-BPNO9-D08_T22_H7_J40_0001-00036 JOB19-BPNO9-D08_T22_H7_J40_0001-00037 JOB19-BPNO9-D08_T22_H7_J40_0001-00039 JOB19-BPNO9-D08_T22_H7_J40_0001-00040 JOB19-BPNO9-D08_T22_H7_J40_0001-00040 JOB19-BPNO9-D08_T22_H7_J40_0001-00042 JOB19-BPNO9-D08_T22_H7_J40_0001-00042 JOB19-BPNO9-D08_T22_H7_J40_0001-00043 JOB19-BPNO9-D08_T22_H7_J40_0001-00044 JOB19-BPNO9-D08_T22_H7_J40_0001-00044 JOB19-BPNO9-D08_T22_H7_J40_0001-00045 JOB19-BPNO9-D08_T22_H7_J40_0001-00046 JOB19-BPNO9-D08_T22_H7_J40_0001-00046 JOB19-BPNO9-D08_T22_H7_J40_0001-00048 JOB19-BPNO9-D08_T22_H7_J40_0001-00049 JOB19-BPNO9-D08_T22_H7_J40_0001-00004 JOB19-BPNO9-D08_T22_H7_J40_0001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00006 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36490.01 3716260.7 36117.32 36117.32 35048.16 35048.16 35048.16 35706.27 37706.27 3880.77 3880.77 3880.77 38880.78	 銀利率 0.28556 0.289409 0.310409 0.276251 0.310409 0.279374 0.276251 0.302651 0.256617 0.259876 0.259876 0.263779 0.268964 0.299103 0.289103 0.299175 0.263678 0.263678 0.302784 0.264729 0.264145 	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84 17843.19 17843.19 18998.55 18998.55 19978.35 20004.17 19575.23 19184.6 21070.27 18679.37 19918.98 18965.46 22339.58 19466.63 18669.37 18164.3 18699.73	16146.96 20064.05 17724.78 16418.52 177024.78 17062.49 16418.52 166647.76 166647.26 18274.12 18274.12 16109.62 15171.41 15971.14 18131.04 18131.04 17496.18 17496.18 17496.18 17497.01 17575.01 17117.95 15218.15 15782.94 20406.03 16775.01 17117.95 15218.15	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 7804.5458 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6354.0536 6426.9695 3618.6158 2372.1739 5538.9735 4561.7698 8582.0096 5419.8961 5419.8961 8090.0839 3989.7001 4380.2596	0.067165214 0.044978594 0.067671325 0.030615126 0.03670916 0.036631343 0.046729572 0.046729572 0.006882555 0.041382481 0.04537643 0.043772511 0.032746634 0.06337328 0.04231485 0.04310979 0.06811555 0.04118979	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3775.6268 3787.9168 2478.6902 4647.6729 3494.449 393.7186 5294.0223 3768.8967 2864.328 2864.328 2864.924 2601.9514 2601.9514 2612.2301 3245.7646 2674.7011 2082.4708 6972.3505 2398.6822 2398.6822 21972.87646 1972.2107 5174.8763 262.6074 1010.08	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729 2859.6046 2777.2542 1777.254
JOB19-BPNO9-D08_T22_H7_J40_0001-00034 JOB19-BPNO9-D08_T22_H7_J40_0001-00036 JOB19-BPNO9-D08_T22_H7_J40_0001-00036 JOB19-BPNO9-D08_T22_H7_J40_00001-00037 JOB19-BPNO9-D08_T22_H7_J40_00001-00039 JOB19-BPNO9-D08_T22_H7_J40_00001-00049 JOB19-BPNO9-D08_T22_H7_J40_00001-00041 JOB19-BPNO9-D08_T22_H7_J40_00001-00042 JOB19-BPNO9-D08_T22_H7_J40_00001-00043 JOB19-BPNO9-D08_T22_H7_J40_00001-00043 JOB19-BPNO9-D08_T22_H7_J40_00001-00044 JOB19-BPNO9-D08_T22_H7_J40_00001-00044 JOB19-BPNO9-D08_T22_H7_J40_00001-00044 JOB19-BPNO9-D08_T22_H7_J40_00001-00045 JOB19-BPNO9-D08_T22_H7_J40_00001-00047 JOB19-BPNO9-D08_T22_H7_J40_00001-00048 JOB19-BPNO9-D08_T22_H7_J40_00001-00049 JOB19-BPNO9-D08_T22_H7_J40_00001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00002 JOB19-BPNO9-D08_T22_H7_J41_00001-00003 JOB19-BPNO9-D08_T22_H7_J41_00001-00006 JOB19-BPNO9-D08_T22_H7_J41_00001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00001	File Type Test Test Test Test Test Test Test Tes	36768.67 40637.42 39623.77 36490.01 39623.77 36490.01 39623.77 36490.01 37162.40 36117.32 36117.32 35048.16 35048.16 35048.16 34549.77 38706.27 37706.27 36880.77 38880.77 38880.77 38880.77 38880.77 38880.77 38880.77 38880.77 38880.77 38880.77 38880.77 38880.77 38880.77 38880.77 38880.77 38880.75 33897.52 35661.92 39371.49 3114.59 36584.6 33897.52 35560.92 34011.32 34013.3 34405.3	 銀利率 0.2856年 0.289409 0.310409 0.276251 0.310409 0.276251 0.310409 0.276251 0.292399 0.303083 0.256517 0.259876 0.259876 0.259876 0.289103 0.289103 0.289103 0.259578 0.259578 0.259578 0.259789 0.281981 0.282628 0.282839 0.289115 0.258799 0.362784 0.302784 0.246729 0.264145 0.25978 	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84 17843.19 17843.19 18998.55 18938.55 19378.35 20004.17 19575.23 19184.6 21070.27 18679.37 19918.98 18965.46 22339.58 1946.65 18679.37 18164.3 18699.37 18164.3 18699.37 18164.3	16146.96 20064.05 17724.78 16418.52 17704.78 17062.49 16418.52 166647.78 16096.86 18274.12 16109.62 15171.41 15971.14 18131.04 18131.04 17696.81 17496.18	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 7804.5458 6354.0536 6364.9695 63618.6158 2372.1739 5538.9735 4561.7698 8582.0096 5419.8961 2372.1739 4222.5934 8090.0839 3989.7001 4380.2596 2505.9835	0.067165214 0.044978594 0.067671325 0.030615126 0.030615126 0.030615126 0.030615126 0.030837734 0.046729572 0.046729572 0.046729572 0.046729572 0.046729572 0.046729572 0.046729572 0.048179295 0.04337563 0.04537563	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3775.6268 3787.9168 2478.6902 4647.6729 3494.449 393.7186 5294.0223 3768.8967 2864.328 2864.328 2861.9514 2601.9514 2412.2301 3245.7646 2674.7011 2082.4708 6972.3505 2398.6822 3245.7646 1972.2107 5174.8763 262.6074 1010.08 3434.977	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729 2259.6046 2777.2542 176.255 2293.7457 3419.4566 3419.4566 3419.4566 3459.6041 1206.3857 873.5907 2864.2724 2479.299 1609.6591 3021.2139 873.5907 2250.3827 22915.2076 3727.0927 3370.1796 -928.9935
JOB19-BPNO9-D08_T22_H7_J40_0001-00034 JOB19-BPNO9-D08_T22_H7_J40_0001-00036 JOB19-BPNO9-D08_T22_H7_J40_0001-00036 JOB19-BPNO9-D08_T22_H7_J40_0001-00037 JOB19-BPNO9-D08_T22_H7_J40_0001-00039 JOB19-BPNO9-D08_T22_H7_J40_0001-00040 JOB19-BPNO9-D08_T22_H7_J40_0001-00040 JOB19-BPNO9-D08_T22_H7_J40_0001-00042 JOB19-BPNO9-D08_T22_H7_J40_0001-00042 JOB19-BPNO9-D08_T22_H7_J40_0001-00043 JOB19-BPNO9-D08_T22_H7_J40_0001-00044 JOB19-BPNO9-D08_T22_H7_J40_0001-00044 JOB19-BPNO9-D08_T22_H7_J40_0001-00045 JOB19-BPNO9-D08_T22_H7_J40_0001-00046 JOB19-BPNO9-D08_T22_H7_J40_0001-00046 JOB19-BPNO9-D08_T22_H7_J40_0001-00048 JOB19-BPNO9-D08_T22_H7_J40_0001-00049 JOB19-BPNO9-D08_T22_H7_J40_0001-00004 JOB19-BPNO9-D08_T22_H7_J40_0001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00001 JOB19-BPNO9-D08_T22_H7_J41_00001-00006 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010 JOB19-BPNO9-D08_T22_H7_J41_00001-00010	File Typ Test Test Test Test Test Test Test Test	36768.67 40637.42 39623.77 36490.01 39623.77 36490.01 39622.77 36473.7 36417.32 36117.32 36117.32 35048.16 35048.16 35048.16 34549.77 37706.27 36880.77 36880.77 3888.752 3688.192 39371.49 39114.59 36584.6 33897.52 35560.98 33971.29 34011.32 34405.3 34405.3 34405.3	 銀利率 0.28556 0.289409 0.310409 0.276251 0.310409 0.279374 0.276251 0.302651 0.256617 0.259876 0.259876 0.263779 0.268964 0.299103 0.289103 0.299175 0.263678 0.263678 0.302784 0.264729 0.264145 	PMDF1 20621.72 20573.37 21898.99 20071.49 21898.99 19374.89 20071.49 20514.68 18561.84 17843.19 17843.19 18998.55 199378.35 20004.17 19575.23 1918.66 21070.27 18679.37 19918.98 18965.46 22339.58 19466.65 18679.37 18164.3 18699.73 18699.73 16002.61 18312.91 20996.71 18992.13	16146.96 20064.05 17724.78 16418.52 17704.78 17062.49 16418.52 166647.78 16096.86 18274.12 16109.62 15171.41 15971.14 18131.04 18131.04 17696.81 17496.18	8648.193 6315.6693 8638.2446 4043.952 8638.2446 4787.8443 4043.952 7804.5458 6354.0536	0.067165214 0.044978594 0.067671325 0.030615126 0.03670916 0.036631343 0.046729572 0.046729572 0.006882555 0.041382481 0.04537643 0.043772511 0.032746634 0.06337328 0.04231485 0.04310979 0.06811555 0.04118979	7614.8102 2739.8021 6291.7553 3787.9168 6291.7553 3775.6268 3787.9168 2478.6902 4647.6729 3494.449 393.7186 5294.0223 3768.8967 2864.328 2801.9514 2412.2901 3245.7646 2674.7011 2082.4708 6972.3505 2598.6822 3245.7646 1972.2107 5174.8763 262.6074 1010.08 3434.977 343.8817	1033.3828 3575.8672 2346.4893 256.0352 2346.4893 1712.2175 256.0352 2400.1989 3156.8729 2859.6046 2777.2542 1777.254

TaskID	File Typ	PMDAIL	獲利率	PMDF1	PMDF4	RandPMDAll	Rand獲利率	RandPMDF1	RandPMDF4
JOB19-BPN09-D08_T22_H7_I41_00001-00017	Test	36846.54	0.320725	18237.5	18609.03	10310.8152	0.089749012	5747.701	4563.1142
JOB19-BPN09-D08_T22_H7_I41_00001-00018	Test	32793.87	0.24723	17642.31	15151.55	3144.0137	0.023702467	2113.8799	1030.1338
JOB19-BPN09-D08_T22_H7_I41_00001-00019	Test	36846.54	0.320725	18237.5	18609.03	10310.8152	0.089749012	5747.701	4563.1142
JOB19-BPN09-D08_T22_H7_I41_00001-00020	Test	34011.32	0.264145	18312.91	15698.41	4380.2596	0.034018792	1010.08	3370.1796
JOB19-BPN09-D08_T22_H7_I41_00001-00021	Test	35957.14	0.272217	18505.26	17451.87	5202.0348	0.039382503	2061.7725	3140.2623
JOB19-BPN09-D08_T22_H7_I41_00001-00022	Test	38999.59	0.270267	18454.56	20545.03	6639.7843	0.046013751	1878.4954	4761.2889
JOB19-BPN09-D08_T22_H7_I41_00001-00023	Test	38999.59	0.270267	18454.56	20545.03	6639.7843	0.046013751	1878.4954	4761.2889
JOB19-BPN09-D08_T22_H7_I41_00001-00024	Test	36513.15	0.263158	19458.31	17054.83	7431.6393	0.053561364	2864.7314	4566.9079
JOB19-BPN09-D08_T22_H7_I41_00001-00025	Test	35957.14	0.272217	18505.26	17451.87	5202.0348	0.039382503	2061.7725	3140.2623
JOB19-BPN09-D08_T22_H7_I41_00001-00026	Test	35670.25	0.29482	17300.54	18369.71	7710.9015	0.063731726	4660.0764	3050.8251
JOB19-BPN09-D08_T22_H7_I41_00001-00027	Test	37457.33	0.292167	19409.7	18047.63	7631.9229	0.059529058	5099.9515	2531.9714
JOB19-BPN09-D08_T22_H7_I41_00001-00028	Test	33678.63	0.245677	16751.14	16927.49	4393.2065	0.032047317	3461.0638	932.1427
JOB19-BPN09-D08_T22_H7_I41_00001-00029	Test	39371.49	0.282628	18965.46	20406.03	4561.7698	0.032746634	2082.4708	2479.299
JOB19-BPN09-D08_T22_H7_I41_00001-00030	Test	33605.29	0.251245	17445.86	16159.43	3543.6333	0.026493464	1308.8909	2234.7424
JOB19-BPN09-D08_T22_H7_I41_00001-00031	Test	36178.58	0.267158	20435.43	15743.14	3641.8125	0.026892723	2008.2412	1633.5713
JOB19-BPN09-D08_T22_H7_I41_00001-00032	Test	32464.63	0.222414	14963.75	17500.88	-217.2907	-0.00148865	730.9178	-948.2085
JOB19-BPN09-D08_T22_H7_I41_00001-00033	Test	36700.51	0.275529	19060.16	17640.34	3881.0231	0.02913681	185.9249	3695.0982
JOB19-BPN09-D08_T22_H7_I41_00001-00034	Test	36968.94	0.267513	19291.18	17677.76	4004.3047	0.028975757	2810.5036	1193.8011
JOB19-BPN09-D08_T22_H7_I41_00001-00035	Test	33148.65	0.238909	17180.2	15968.46	2029.8643	0.014629653	1436.3583	593,506
JOB19-BPN09-D08_T22_H7_I41_00001-00036	Test	35414.26	0.286141	19767.15	15647.11	7548.7574	0.060992667	5929.6695	1619.0879
JOB19-BPN09-D08_T22_H7_I41_00001-00037	Test	36344.45	0.268383	19413.84	16930.61	5234.57	0.038654335	6109.1882	-874.6182
JOB19-BPN09-D08_T22_H7_I41_00001-00038	Test	36700.51	0.275529	19060.16	17640.34	3881.0231	0.02913681	185.9249	3695.0982
JOB19-BPN09-D08_T22_H7_I41_00001-00039	Test	36513.15	0.263158	19458.31	17054.83	7431.6393	0.053561364	2864.7314	4566.9079
JOB19-BPN09-D08_T22_H7_I41_00001-00040	Test	37162.44	0.292399	20514.68	16647.76	4878.8891	0.038387734	2478.6902	2400.1989
JOB19-BPN09-D08_T22_H7_J41_00001-00041	Test	36682.65	0.265441	20204.62	16478.03	4426.286	0.032029277	3016.4281	1409.8579
JOB19-BPN09-D08_T22_H7_I41_00001-00042	Test	36682.65	0.265441	20204.62	16478.03	4426.286	0.032029277	3016.4281	1409.8579
JOB19-BPN09-D08_T22_H7_I41_00001-00043	Test	36682.65	0.265441	20204.62	16478.03	4426.286	0.032029277	3016.4281	1409.8579
JOB19-BPN09-D08_T22_H7_I41_00001-00044	Test	38407.77	0.318909	19142.19	19265.58	9135.5581	0.075854678	3279.8946	5855.6635
JOB19-BPN09-D08_T22_H7_I41_00001-00045	Test	36376.9	0.270843	20887.89	15489.01	5500.9136	0.040956843	5793.8034	-292.8898
JOB19-BPN09-D08_T22_H7_I41_00001-00046	Test	34167.9	0.251281	17943.53	16224.37	4846.8186	0.035644924	3423.5177	1423.3009
JOB19-BPN09-D08_T22_H7_I41_00001-00047	Test	34755.55	0.275871	18958.16	15797.39	5068.8895	0.040234072	4883.8873	185.0022
JOB19-BPN09-D08_T22_H7_I41_00001-00048	Test	33054.34	0.248156	17533.75	15520.59	-6.7692	-5.082E-05	676.6554	-683.4246
JOB19-BPN09-D08_T22_H7_I41_00001-00049	Test	33054.34	0.248156	17533.75	15520.59	-6.7692	-5.082E-05	676.6554	-683.4246
JOB19-BPN09-D08 T22 H7 I41 00001-00050	Ţest	33054.34	0.248156	17533.75	15520.59	-6.7692	-5.082E-05	676.6554	-683.4246
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